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# The Everglades National Park and Big Cypress National Preserve Vegetation Mapping Project

Interim Report: *Shark River Slough/Long Pine Key (Region 1),  
Everglades National Park*



**US Army Corps  
of Engineers®**



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## ON THE COVER

Scrub Cypress (*Taxodium* sp.) in a graminoid prairie comprised of Sawgrass (*Cladium jamaicense*), Muhly Grass (*Muhlenbergia capillaris*), Panicgrass (*Panicum* sp.), and Little Bluestem (*Schizachyrium rhizomatum*) located south-east of Long Pine Key, Everglades National Park. Photo credit: Theodore N. Schall (23 March 2006).

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## Acronyms and Abbreviations

2D:	Two-dimensional
3D:	Three-dimensional
AA:	Accuracy Assessment Point
BICY:	Big Cypress National Preserve
CERP:	Comprehensive Everglades Restoration Plan
CIR:	Color infrared
EVER:	Everglades National Park
GE:	Greater Everglades
GPS:	Global Positioning System
ha:	Hectare
HARN:	High Accuracy Reference Network adjustment of NAD83
km:	Kilometer
MAP:	Monitoring and Assessment Plan
N/A:	Not applicable
NAD83:	North American Datum of 1983
NAVD88:	North American Vertical Datum of 1988
NIR:	Near infrared
NPS:	National Park Service
RECOVER:	REstoration COordination and VERification
RMSE:	Root mean square error
RTKGPS:	Real-time kinematic Global Positioning System
SFCN:	South Florida Caribbean Network
SFWMD:	South Florida Water Management District
TIFF:	Tagged Image File Format
TP:	Training Point
USACE:	United States Army Corps of Engineers
UTM:	Universal Transverse Mercator Projection
VCSFNA:	Vegetation Classification System for South Florida Natural Areas
VMI:	Vegetation Mapping Inventory Program
VP:	Verification Point
WCA:	Water Conservation Area
WRDA:	Water Resource Development Act

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## Summary

The Everglades National Park (ENP) and Big Cypress National Preserve (BICY) vegetation mapping project is part of the Comprehensive Everglades Restoration Plan (CERP). It is a cooperative effort between the South Florida Water Management District (SFWMD), the United States Army Corps of Engineers (USACE), and the National Park Service Vegetation Mapping Inventory Program (NPS-VMI). The goal of this project is to produce a spatially and thematically accurate vegetation map of Everglades National Park and Big Cypress National Preserve prior to the completion of restoration efforts associated with CERP. This map product will serve as a record of baseline vegetation conditions for the purpose of: (1) documenting changes to the spatial extent, pattern, and proportion of plant communities within these two federally-managed units as they respond to hydrologic modifications resulting from the implementation of the CERP; and (2) providing vegetation and land-cover information to NPS managers and scientists for use in park management, resource management, research, and monitoring.

The ENP and BICY vegetation mapping project covers an area of approximately 7,400 square kilometers (1.84 million acres) and consists of seven mapping regions: four regions in Everglades National Park, Regions 1 through 4, and three in Big Cypress National Preserve, Regions 5 through 7. The report that follows focuses on the mapping effort associated with Region 1, including the Shark River Slough and Long Pine Key areas within Everglades National Park. Region 1 encompasses a total area of 1,622 square kilometers (400,875 acres) and is geographically located to the south of the Water Conservation Area, north of the Southeast Coastal Everglades (Region 2) and east of the Southwest and Northwest Coastal Everglades (Regions 3 and 4).

Photo-interpretation was performed by superimposing a 50×50-meter (0.25 hectare or 0.61 acre) grid cell vector matrix over stereoscopic, 0.3 meters (1 ft.) spatial resolution, color infrared (CIR) aerial imagery using a digital photogrammetric workstation. Photo-interpreters identified the majority community in each cell by applying majority-rule algorithms, recognizing community-specific spectral signatures, and referencing an extensive ground-truth database. The majority vegetation community within each grid cell was classified using a hierarchical classification system developed specifically for this project. Additionally, photo-interpreters categorized the absolute cover of cattail (*Typha* spp.) and any invasive species detected as either: Sparse (10-49%), Dominant (50-89%), or Monotypic (≥90%) cover within the quarter-hectare grid mapping cell.

A total of 134 thematic classes were used to map Region 1. The most common thematic classes are Short Sawgrass Marsh-Dense and Graminoid Freshwater Prairie. These two classes account for 33.6% and 28.1% of the map, respectively. Mixed Graminoid Freshwater Marsh, Spikerush Marsh, and Tall Sawgrass Marsh-Dense are the next three dominant community types and combine for about 18% of the map. The Region 1 vegetation map has a thematic class accuracy of 89.7% with a lower 90th Percentile Confidence Interval of 87.0%.

## 1 Introduction

The Everglades National Park and Big Cypress National Preserve vegetation mapping project is a component of the Comprehensive Everglades Restoration Plan (CERP). It is a cooperative effort between the South Florida Water Management District (SFWMD), the United States Army Corps of Engineers (USACE), and the National Park Service Vegetation Mapping Inventory Program (NPS-VMI). The goal of the project is to produce a spatially and thematically accurate vegetation map of Everglades National Park and Big Cypress National Preserve. This vegetation map will serve as a record of baseline conditions needed to: (1) document changes to the spatial extent, pattern, and proportion of plant communities within these two federally managed units as they respond to management driven hydrologic modifications resulting from the implementation of the CERP; and (2) provide vegetation and land-cover information to NPS park managers and scientists for use in park management, resource management, research, and monitoring.

### 1.1 Comprehensive Everglades Restoration Plan

Title VI Section 601 of the Water Resource Development Act (WRDA) of 2000 authorized the Comprehensive Everglades Restoration Plan (CERP) as the framework for the modifications and operational changes needed to restore, preserve, and protect the south Florida ecosystem (Water Resource Development Act 2000). As part of the CERP, Congress authorized the REstoration COordination and VERification (RECOVER) program to: (1) organize and provide scientific and technical support to the interagency body of scientists and managers implementing the CERP, and (2) provide a mechanism, through the Monitoring and Assessment Plan (MAP), for assessing the performance of the CERP (RECOVER 2004). The goal of the CERP Monitoring and Assessment Plan is to have a system-wide monitoring and assessment plan that is supported and used by all CERP participants, including tribal nations, to track and measure system wide responses to the implementation of the CERP (RECOVER 2004).

The MAP consists of six monitoring modules designed to document and establish pre-restoration reference conditions for the Greater Everglades (GE) region, which includes Everglades National Park and Big Cypress National Preserve (**Figure 1**). Monitoring and Assessment Plan Module Number 3.1.3.4 specifically calls for the creation of a spatially and thematically accurate vegetation map of the entire GE project area that would serve, along with other metrics, as baseline conditions to assess the system-wide performance of the CERP over the next several decades (RECOVER 2004).

For more information regarding the CERP, please visit the Comprehensive Everglades Restoration Plan website at <https://www.evergladesrestoration.gov/>.

### 1.2 Project History

The Everglades National Park and Big Cypress National Preserve vegetation mapping project covers an area of approximately 7,400 square kilometers (1.84 million acres) and consists of seven mapping regions: four regions in Everglades National Park, Regions 1 through 4, and three in Big Cypress National Preserve, Regions 5 through 7 (**Figure 1**). Vegetation mapping within ENP and BICY was initiated in 2006 with a subcontract awarded by NPS to Avineon, Inc. This initial mapping contract included one-third of Big Cypress National Preserve (Region 7; 891 square kilometers [220,171 acres]) and the northwest corner of Region 4, Region 4 NW, (243 square kilometers [60,047 acres]) in Everglades National Park (**Figure 1**). The SFWMD completed a 406 square kilometer (100,325 acres) section of Everglades National Park in 2010 that included the northernmost portion of Region 1 (**Figure 1**). Upon completion of this initial section

within Region 1, the photo-interpretation portion of the remaining sections of the map were transferred to the USACE District office in Jacksonville, Florida, while project data collection and field support were delegated to the NPS South Florida Caribbean Network (SFCN) located in Palmetto Bay, Florida. In 2015, the SFCN took on the mapping responsibilities associated with Regions 2 through 6 of this project (**Figure 1**). This change allowed the project to take advantage of the SFCN's institutional knowledge of botany, community ecology, and remote sensing as well as efficiencies afforded by the network's proximity to Everglades National Park and Big Cypress National Preserve. The USACE priorities then shifted toward the completion of Region 1 and assisting with the final quality assurance and quality control (QA/QC) of mapped products.

### 1.3 Study Area

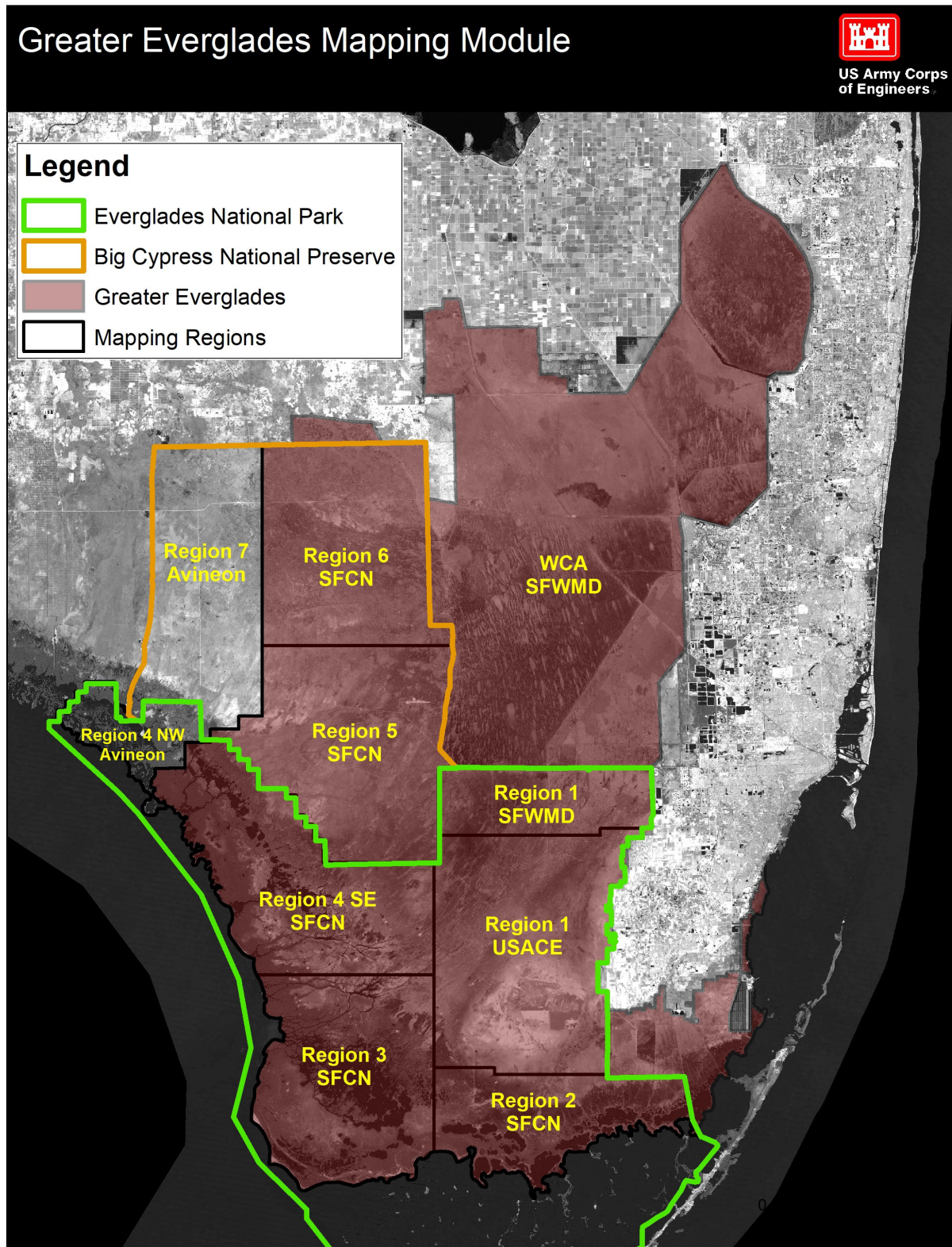
This report focuses on the mapping effort associated with Region 1, including the Shark River Slough and Long Pine Key areas within Everglades National Park. Region 1 encompasses a total area of 1,622 square kilometers (400,875 acres) and is geographically located to the south of the Water Conservation Area, north of the Southeast Coastal Everglades (Region 2) and east of the Southwest and Northwest Coastal Everglades (Regions 3 and 4, **Figure 1**).

Everglades National Park is the third-largest national park within the contiguous United States, and the largest park east of the Mississippi River. Congress authorized the establishment of the park in 1934 to protect an ecosystem threatened by drainage, poaching, agricultural development, and urbanization. This was the first time that Congress authorized a national park for the protection of an ecosystem and its biological value, rather than a geographic feature.

Located on the southern tip of the Florida peninsula at about 2° north of the Tropic of Cancer (25.5° N Latitude), the climate of Everglades National Park is more similar to those of tropical regions than that of the continental United States (Duever et al. 1994). Mean daily temperatures range from 17-25°C (62.6-77°F) with average mean daily temperatures rarely falling below 10°C (50°F) during the winter months (Duever et al. 1994; Obeysekera et al. 1999). However, temperatures at or below freezing do occur. There is a well-defined rainy season, May through October, and a dry season, November through April. Rainfall during the summer rainy season typically accounts for nearly 60% of the annual rainfall, which ranges between 119-157 centimeters (46.8-61.8 inches) per year (Duever et al. 1994).

Ground surface elevations within Everglades National Park range from around sea level near the coast to 4.3 meters (14.1 feet) above sea level in the interior forests and tree islands. Vegetation communities are arranged along this narrow elevation gradient creating a patch mosaic of mangrove swamps, graminoid marshes and prairies, hammocks, and pine woodlands, where elevational differences in millimeters not only determine inundation frequency and duration, but also the community type.

Because of its geographic location and mild climate, Everglades National Park is home to a unique assemblage of both tropical and temperate species. It is home to 400 species of birds, 800 species of vertebrates, 1,600 species of vascular plants, and 125 species of fish; of which 202 are federally- or state-listed species (Patterson et al. 2008). The park is also the only place in the world where alligators (*Alligator mississippiensis*) and crocodiles (*Crocodylus acutus*) coexist.



**Figure 1. Greater Everglades mapping module and designated mapping regions within Everglades National Park and Big Cypress National Preserve.**

Many of the external pressures and challenges that prompted the creation of Everglades National Park are still present today. Management decisions and restoration efforts are tied to water quantity and quality issues. Additional stresses from invasive species like the Burmese Python (*Python bivittatus*) and Brazilian pepper (*Schinus terebinthifolius*), climate change, sea-level rise, and a host of other issues continue to challenge park managers and biologists.

## 2 Methods

The Shark River Slough/Long Pine Key, Region 1, vegetation map was stereoscopically photo-interpreted using digital photogrammetric workstations and 4-band digital aerial imagery. Ground-truthing data were collected in the field to inform the photo-interpreters regarding individual species and communities associated with unique combinations of color, texture, location, elevation, height, and other environmental characteristics observed within the stereo imagery. Additional ground-truthing data were withheld from the photo-interpreters for use as independent accuracy assessment data. The resulting vegetation map of Shark River Slough/Long Pine Key, Region 1, was completed as a collaborative effort between the United States Army Corps of Engineers, National Park Service, and South Florida Water Management District.

### 2.1 Imagery

The aerial imagery used to create the Shark River Slough/Long Pine Key, Region 1, vegetation map, including the other three regional maps within Everglades National Park, consists of 0.3 meter (1 foot) spatial resolution multispectral digital imagery procured by the SFWMD in April 2009. The imagery was acquired using a Microsoft-Vexcel UltraCam-X large format digital aerial camera. The UltraCam-X acquires high resolution multispectral images, including spectral reflectance in the red, green, blue, and near infrared portions of the electromagnetic spectrum. The resulting digital imagery was stored as a collection of 4-band Tagged Image File Format (TIFF) images with approximately 12-bit spectral sensitivity or 4,095 possible color values within each of the four spectral bands. Image acquisition occurred at an average flight altitude of 4,163 meters (13,658 feet) with an average forward overlap of 60% to allow for stereoscopic (3D) visualization.

A network of 12 aerial targets deployed throughout Everglades National Park were used to verify the accuracy of the aircraft's onboard positioning and attitude instrumentation. The horizontal and vertical location of each of the aerial targets was determined using 1-hour static GPS data post-processed using NGS Opus Rapid Static procedures (<https://www.ngs.noaa.gov/OPUS/about.jsp>). In addition, a real-time kinematic GPS (RTKGPS) observation and sensor attitude information, including roll, pitch, and yaw, were acquired for each image exposure location. The network of 12 ground targets, 2,106 RTKGPS image exposure locations, and attitude data were adjusted by the SFWMD using standard least-squares methods (weighted average), where the locations of the aerial targets were given weighted preference over the RTKGPS image exposure locations and attitude measurements. Each target and image were referenced relative to the North American Datum of 1983 (NAD83) High Accuracy Reference Network (HARN), State Plane Coordinate System, Florida East Zone, and North American Vertical Datum of 1988 (NAVD88). A correlation analysis between the horizontal and vertical location of each aerial target and the imagery indicated that the horizontal and vertical accuracy of the image dataset met or exceeded FGDC standards for horizontal Second Order Class II (Root Mean Square Error [RMSE] of 0.445 m) and vertical Third Order (RMSE of 0.372 m) locations.

## 2.2 Photo-interpretation

The Shark River Slough/Long Pine Key, Region 1, vegetation mapping project employed a grid-based, 50×50-meter (0.25 hectare or 0.61 acre) cell, majority rule<sup>1</sup> mapping approach (Rutchey et al. 2008). In contrast to traditional vector mapping methods, where vegetation communities are delineated based on observable boundaries and a set minimum mapping unit (e.g., 100 square meters), grid-based mapping relies on the determination of the majority community or land cover type present within each grid cell.

At each grid mapping cell, photo-interpreters determined and classified the majority vegetation community to species level, wherever possible, using the *Vegetation Classification System for South Florida Natural Areas* (Rutchey et al. 2006) as modified in **Appendix B**. Photo-interpreters additionally categorized the absolute cover of cattail (*Typha* spp.) and any invasive exotic species present in each grid cell as either: Sparse (10-49%), Dominant (50-89%), or Monotypic ( $\geq 90\%$ ) cover within the quarter-hectare grid mapping cell.

Grid-based mapping has significant advantages over the traditional vector mapping approach. For example, it: (1) reduces mapping cost on a per-area basis; (2) reduces photo-interpreter variability; and (3) produces vegetation maps with more landscape heterogeneity since the photo-interpreter must view and classify the majority vegetation or land cover type within each cell individually (Rutchey and Godin 2009). Grid-based maps are generally better suited for vegetation change analysis and complex map algebra than vector maps (Rutchey and Godin 2009) and provide a standardized method for spatial data collection at multiple scales (Ramsdale et al. 2017). However, because of the aggregative nature of the majority rule, dominant features tend to increase in overall abundance while smaller features tend to decrease in overall abundance becoming less common within the map (He et al. 2002). Consequently, if a grid cell contains two or more community types of nearly equal cover, the less abundant, rare community within the region was selected over a more common community type. For example, in Shark River Slough, American white waterlily (*Nymphaea odorata*) sloughs are less abundant than sawgrass marshes or Gulf Coast spikerush sloughs. Thus, a split cell containing waterlily and another community type like sawgrass or Gulf Coast spikerush, having equal cover within the grid cell, would be classified as waterlily to ensure this community is not underrepresented or missed entirely from the mapping product. Similarly, grid cells dominated by non-vegetative cover like water, mud, tidal flat, levee, and canal for example, with at least 40% (natural) vegetation cover were classified based on the natural vegetation class and not the dominant non-vegetative class within the cell.

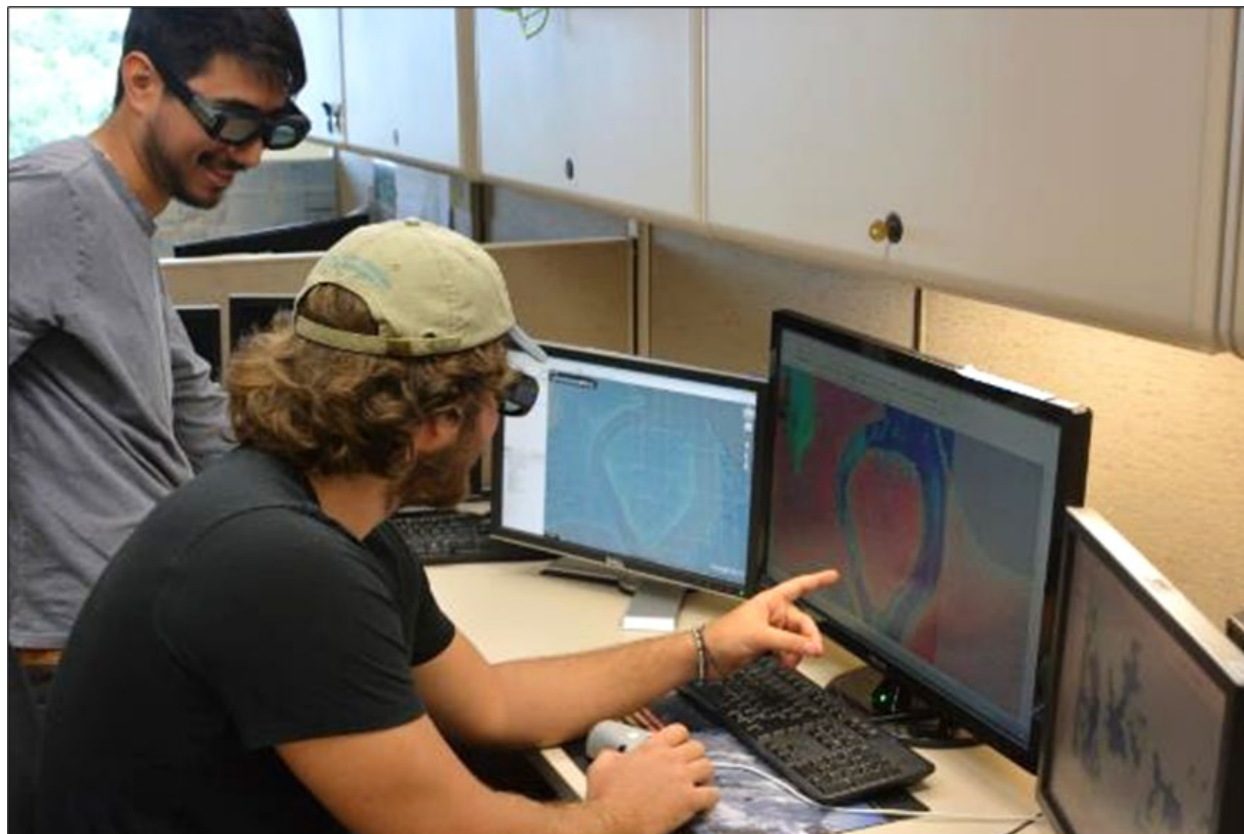
### 2.2.1 Photogrammetric Workstations

Stereoscopic interpretation of the aerial imagery was accomplished utilizing a digital photogrammetric workstation running DAT/EM's Summit Evolution (**Figure 2**). Summit Evolution is a commercial software designed for viewing, capturing, and analyzing three-dimensional (3D) vector information created from stereoscopic imagery. The Summit Evolution photogrammetric software integrates seamlessly with Earth Science Research Institute's (ESRI) ArcGIS mapping and GIS software allowing for, but not limited to, the visualization of 3D spatial data, vector data visualization and editing, and attribute population. Photo-interpreters analyzed the spectral signature of each grid mapping cell using two of three different color channel assignments within Summit Evolution (**Table 1**). Channel assignments 1 (NIR, Red, Green [CIR]) and 2 (Blue, Green, NIR) were viewed simultaneously utilizing a split stereo screen configuration within Summit Evolution. These two unique color viewing configurations were primarily used throughout Region

<sup>1</sup> The community with the greatest percent cover (majority) in the grid cell.



1 to differentiate community types and species within each grid mapping cell. For instance, channel assignment 1, generally referred to as color infrared or CIR, is a commonly used band combination for identifying vegetation from remotely sensed data while channel assignment 2 was more effective in the identification of unique graminoid habitats transitioning from marsh to marl prairie.



**Figure 2. Photo-interpreters (Michael Foguer, left, and Alejandro Arteaga Garcia, right) working on a photogrammetric workstation running Summit Evolution at the NPS-SFCN office in Palmetto Bay, Florida. Similar 3D workstations were utilized by the SFWMD and USACE to map Region 1.**

**Table 1. Designated image channel assignments and their corresponding spectral band combinations utilized within the Summit Evolution photogrammetric workstation environment to identify vegetation communities from the aerial imagery. Numbers in parentheses correspond to the band number assignment within the digital imagery.**

Channel Assignment	Spectral Band Combination	Common Description
0	Red (0), Green (1), Blue (2)	Natural Color
1	NIR (0), Red (1), Green (2)	Color Infrared
2	Blue (0), Green (1), NIR (2)	N/A

### 2.2.2 Cover Estimates

Vegetation cover for each discrete community type present was estimated by partitioning the 50×50-meter grid mapping cell into twenty-five 10×10-meter sub-cells, each 100 square meters in size or 4% of the larger grid mapping cell. Partitioning of the grid mapping cells was accomplished by creating a custom cursor overlay within Summit Evolution with the following parameters: Grid size = 10 meters (32.8 feet); Columns = 6; and Rows = 6. The resulting 5×5-square gridded cursor arrangement allowed photo-interpreters to quickly count the number of 100 m<sup>2</sup> sub-cells occupied by a discrete community type within each 50×50-meter grid mapping cell in order to determine the appropriate majority class.

### 2.2.3 Canopy Height Estimates

The vegetation height of the majority community type within each grid cell was estimated, when applicable, by setting the 5×5 gridded cursor overlay at the cutoff height for a specific class of interest, for example 5-meters (16.4 feet) above the apparent ground for the cutoff height between Forest and Shrubland related classifications, and counting the number of cells above and below the cutoff height for the community type in question. When the grid count or area was approximately the same, the higher canopy height class was chosen over the lower height associated class to indicate the peak height classification of the appropriate community. For example, Bayhead Forest was preferred to Bayhead Shrubland when the height and area estimation were roughly the same between the two classes within a particular grid mapping cell. Additionally, the zoom factor on the photogrammetric workstation was set to 4x to ensure consistency in canopy height estimation by all photo-interpreters. Canopy height estimation of digital images is scale-dependent, due to the way the imagery is stored as hierarchical, low to high resolution, image pyramids. Thus, using a lower zoom factor (e.g., 2x or 1x) could lead to a less precise estimate of canopy height since a lower resolution image pyramid would be used for the height measurements.

## 2.3 Vegetation Classification System

The Vegetation Classification System for South Florida Natural Areas (VCSFNA) is a multi-tiered hierarchical classification system developed specifically to map the natural areas occurring within the Greater Everglades (GE) restoration footprint, including the Florida Keys (Rutchev et al. 2006). Creation of the VCSFNA was a multi-year collaborative effort that included numerous mapping scientists, botanists, and experts on south Florida community ecology and botany. This classification system fills the gap in the level of detail and lack of specificity found within the U.S. National Vegetation Classification System when it comes to the classification of south Florida plant communities (Rutchev et al. 2006). The latest version of the VCSFNA is v6.10.09.

The VCSFNA is a living dynamic document; open to modification as new classes or communities not listed in the classification system are observed in the field. For example, in version v2.1.07 several modifications to the classification system were made in response to field observations and data collected by Ross et al. (2006). Similarly, Ruiz et al. (2008) suggested the inclusion of twenty-one new classes to the classification system based on their observations and work mapping Biscayne National Park. Since plant associations can be fluid combinations of many species, keeping the VCSFNA open to modification ensures that the classification system remains a useful and comparable way to record plant assemblages over successive generations of vegetation mapping.



The classification system used in this project (**Appendix B**) is a derivative of the VCSFNA. It differs from its parent system in several ways:

1. The hierarchical pathways between levels were modified to help photo-interpreters consistently reach the same vegetation class and reduce photo-interpreter variability.
2. Several vegetation class definitions were modified to clarify meaning and to reflect regional differences in species composition.
3. Vegetation classes not occurring within the mapping area were removed, while region-specific observed and documented vegetation classes were added.
4. The entire vegetation classification key for invasive plant species was not included in this document because it includes all possible known invasive plant species present within south Florida.

The top of the classification system, Level 1 (Class), provides the lowest level of detail about plant communities and is based on dominant physiognomy (physical structure) as follows:

- **Forest (F)**—Stands of trees (5 meters [16.4 ft.] or taller) that are of high density (50-100% cover).
- **Woodland (W)**—Stands of trees (5 meters [16.4 ft.] or taller) that are of low density (10-49% cover). Trees are evenly spaced out and often in a matrix of sparse shrubs, graminoids, and/or herbaceous vegetation.
- **Shrubland (S)**—Stands of shrubs (shorter than 5 meters [16.4 ft.]) that are of high density (50-100% cover).
- **Scrub (C)**—Stands of shrubs or dwarf trees (shorter than 5 meters [16.4 ft.]) that are of low density (10-49% cover). Shrubs and/or dwarf trees are evenly spaced out and often in a matrix of graminoids and/or herbaceous vegetation.
- **Marsh (M)**—Graminoid and/or herbaceous emergent or floating vegetation in shallow water that stands at or above the ground surface for much of the year. Prairie habitat is included in this class. A marsh can have low density (0-9%) tree and shrub cover.
- **Dune (D)**—Shrub, graminoid and/or herbaceous vegetation associated with a mound or ridge of sediment formed by wind and/or storm deposits.
- **Submerged Aquatic Vegetation (A)**—Vegetation inhabiting a submerged freshwater or marine environment, e.g., *Vallisneria* spp. or *Thalassia* spp.
- **Exotic (E)**—Invasive non-native plant species assemblages.
- **Other (O)**—Anthropogenic or non-vegetative features.

At the next level, Level 2 (Subclass), the physiognomically defined Level 1 classification is modified with a hydrologic designation, e.g., Wetland Forest versus Upland Forest; this is a new modification to the classification system not found in v6.10.09. The next tier, Level 3 (Group), replaces the hydrologically defined Level 2 with a community designation based on additional physiognomic and environmental factors, e.g., Mangrove Forest, Swamp Forest, or Hardwood Hammock. At Level 4 (Alliance), communities

are defined based on the dominant diagnostic species in the upper most stratum, e.g., Black Mangrove Forest, Buttonwood Forest, or Live Oak Hammock. The remaining three levels of the classification system, Level 5 (Sub alliance), Level 6 (Association), and Level 7 (Sub association), continue to subdivide the previous community types by dominant canopy species composition and the understory species assemblages; for example, a Level 7 mixed-mangrove scrub community in a matrix of sawgrass would have the following nomenclature: Buttonwood-Red Mangrove Scrub-Sawgrass Marsh.

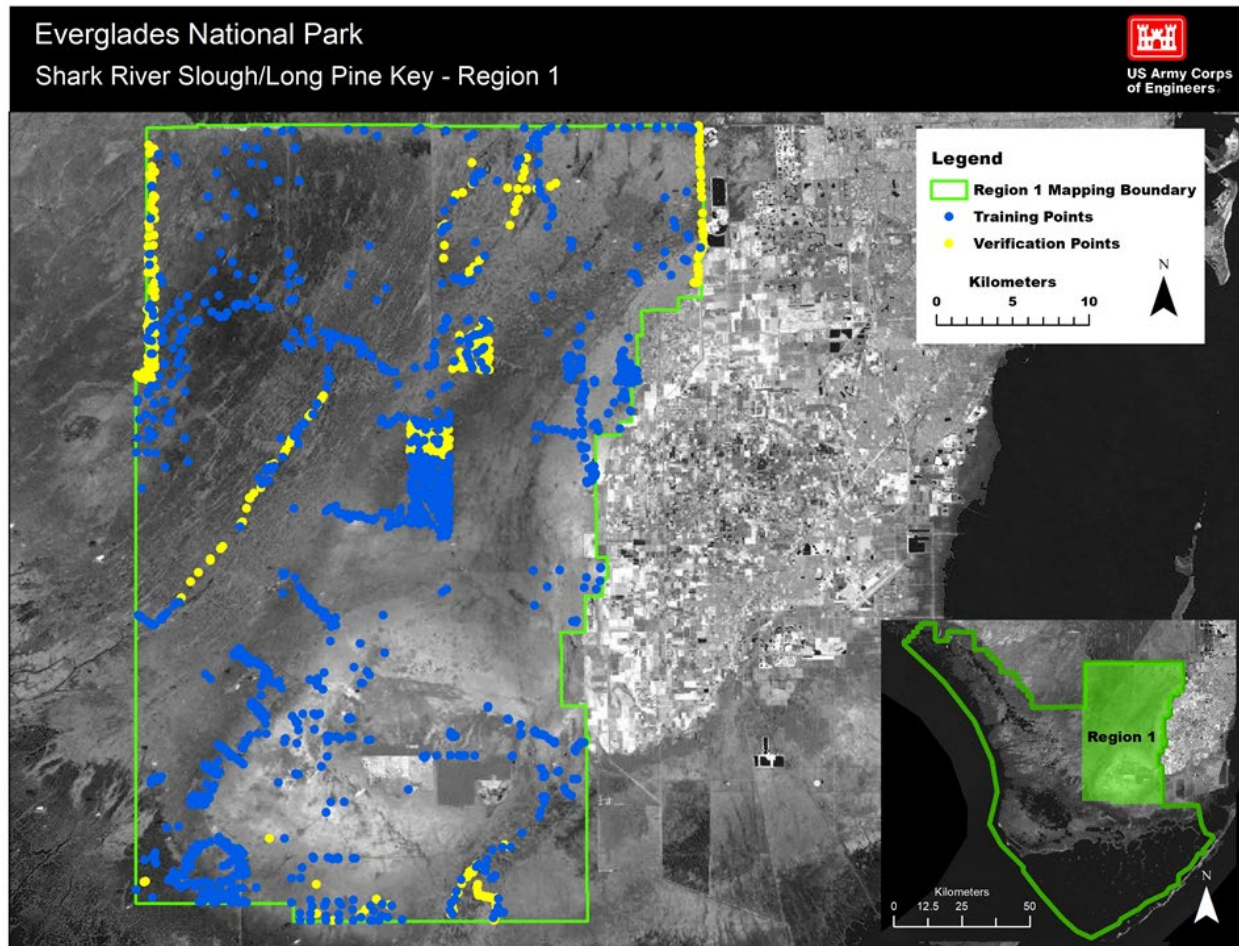
Taxonomic references in the classification system and this document utilize the Integrated Taxonomic Information System described at <https://www.its.gov/>.

## 2.4 Vegetation Data Collection

Site specific vegetation data collected for this project includes Training Points (TP), Botanical Training points (BT), Verification Points (VP), and Accuracy Assessment data points (AA). Most of this data was collected by the SFCN. However, staff from the SFWMD and USACE were present on several data gathering trips. The Accuracy Assessment points, collected by SFCN exclusively, are discussed later in this document. A total of 1,708 Training Points and Verification Points were collected within Region 1 (**Figure 3**). The Training Point and Botanical Training data provide species-specific compositional data and structural information. Training Points characterize the majority community within a grid mapping cell. In some instances, however, they represent plant communities smaller than the quarter-hectare (0.62-ac) grid mapping cell (e.g., patches of cattails, water lily, or other species-specific community types). Botanical Training points were used to educate staff and photo-interpreters regarding the flora and vegetation communities of south Florida. These data points were intended to characterize community types that extended beyond the boundary of a single grid mapping cell, e.g., Bayhead Forests, Sawgrass Marshes, Black Mangrove Forests, or Cypress Swamps, even though the data point or representative polygon typically indicate units smaller than the quarter-hectare (0.62-ac) grid mapping cell.

The data collection method for the Training Points and the Accuracy Assessment data was identical. Field staff recorded data on a pre-printed datasheet showing an aerial image of the area being sampled. Data recorded included visual estimation of canopy height and vegetation cover, the relative cover of each strata (tree, shrub, and herb), the relative cover of the dominant species within each stratum, and the maximum canopy height for each stratum. In addition, digital oblique photos were taken at each Training Points and Accuracy Assessment site to document the structure and other characteristics of the sampled area.

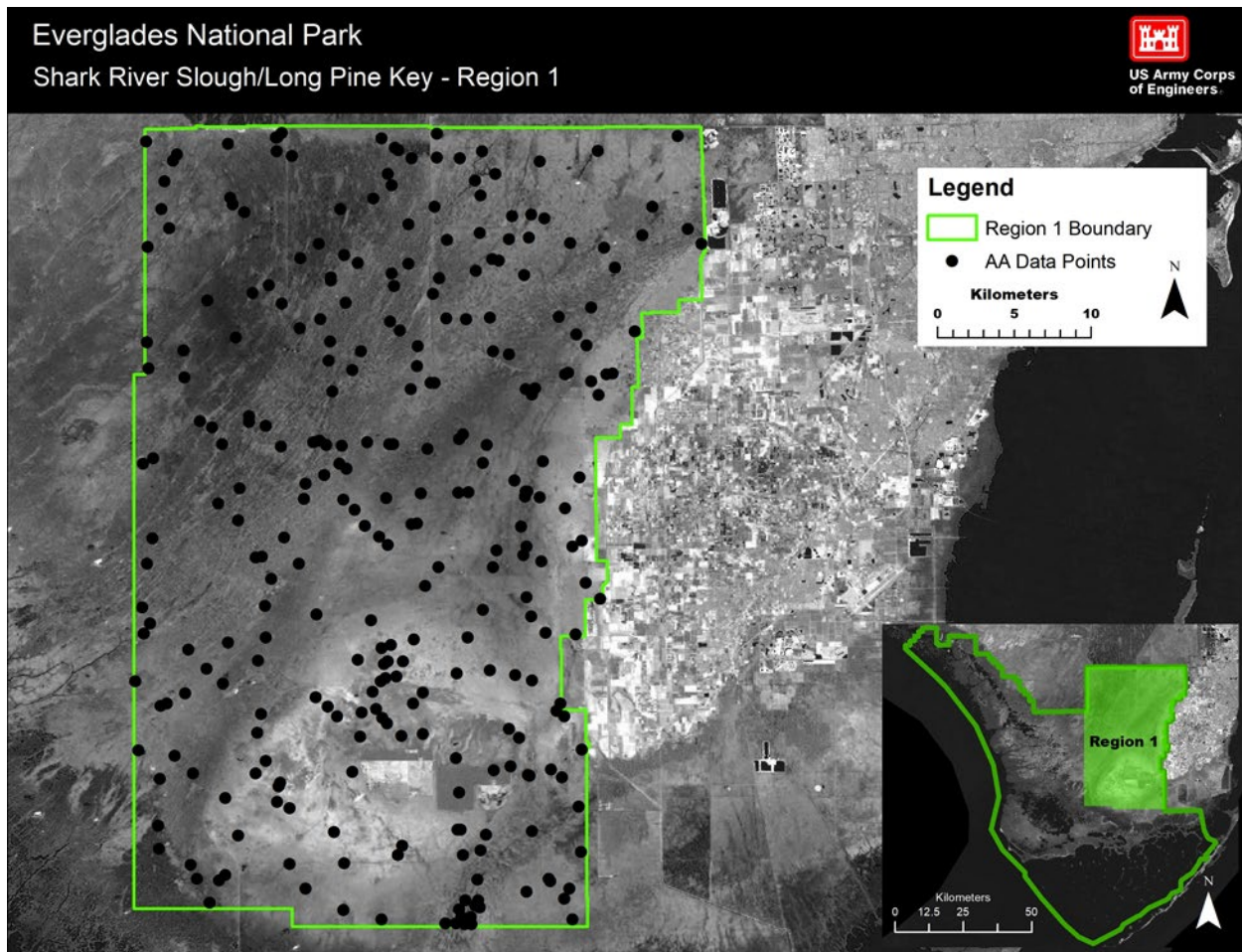
The other type of field data collected were Verification Points. These points complement the Training Point data collection process and serve two purposes: (1) to confirm a common, typically homogeneous, spectral signature within the landscape (e.g., Temperate Hardwood Hammock or Cypress Forest); and (2) document field observed vegetation information, e.g., clumps of Sand Cordgrass (*Spartina bakeri*) or Black-topped Sedge (*Schoenus nigricans*) within a contrasting vegetation type. Typically, structural and composition data was not collected. However, information about key species and canopy height were often recorded to assist photo-interpreters in recognizing species within the area of interest. The VP points were also used to document past disturbance history, invasive species presence, or any other natural phenomena encountered while conducting data collection missions. These data points took significantly less time to collect than the Training Points and substantially reduced the cost associated with field data collection.



**Figure 3. Location of Training Points (TP) and Verification Points (VP) collected within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

## 2.5 Accuracy Procedures

The thematic accuracy of the Everglades National Park and Big Cypress National Preserve vegetation maps will be assessed using 2,114 randomly selected grid cells across all seven regions collected between 2008 and 2015. The Accuracy Assessment data contains the same type of information collected in the Training Point and Botanical Training points discussed above. The Accuracy Assessment data for the Shark River Slough/Long Pine Key, Region 1, vegetation map included 290 locations visited and described between January and August of 2010 (**Figure 4**). The timely collection of the accuracy assessment points with respect to the aerial imagery acquisition (April 2009) ensured that temporal vegetation change resulting from natural community succession or perturbation events, like fires and windstorms, would have a minimal impact on final map accuracy.



**Figure 4. Location of 290 Accuracy Assessments points (AA) collected within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

The thematic accuracy of the Shark River Slough/Long Pine Key, Region 1, vegetation map is calculated as the number of assessment locations considered acceptable divided by the total number of assessment points within the Region 1. In addition, a 1-tailed 90% confidence level was calculated using Zar (1999, p. 527) to determine whether the overall map accuracy is equal to or greater than 80% with 90% confidence as required by the NPS Vegetation Mapping Inventory Program. Grid cells were accepted or rejected based on a thorough review of the Accuracy Assessment data, including the photos collected. Acceptable points included: (1) those that had a one-to-one match between the vegetation class on the map and the field collected data, and (2) those for which the vegetation class differed from the field dataset, but were considered acceptable because:

1. The Accuracy Assessment data indicated that the vegetation label was at the boundary between two classes due to height or cover cutoff parameters. For example, if the AA data indicated that the height of the majority Bayhead classification was within 5% of the cutoff (5-meters [16.4-ft.]) between Forest and Shrubland classes, then a Bayhead Forest or Bayhead Shrubland could be an acceptable classification. Similar reasoning would apply to area-based boundary criteria such as Forest versus Woodland that have a 50% cover cutoff or Marsh versus Scrub that have a 10% woody cover cutoff criteria.

2. The vegetation map class was at a more detailed level than the Accuracy Assessment classification, but the field notes supported the more detailed label as correct.
3. The class modifier for sawgrass, which includes short-dense, short-sparse, tall-dense, and tall-sparse, was misclassified due to cover or height cutoff parameters.
4. The discrepancy between the AA point and the vegetation map classification resulted from the presence of two co-dominant communities, split cell/majority-rule decision, within the grid-cell.

The project manager, lead photo-interpreter, and the photo-interpreters working on the project did not have access to any of the accuracy assessment data throughout the mapping effort.

### 3 Results

The Shark River Slough/Long Pine Key, Region 1, vegetation map consists of 648,914 quarter-hectare grid mapping cells and has 134 thematic classes (**Figure 5**). These thematic class fall into six vegetative communities (Forest, Woodlands, Shrublands, Scrub, Marshes, and Invasive Species) and a miscellaneous category (Other) that captures non-vegetative and anthropogenic classes. The majority of all the thematic classes, 124 out of 134 (92%), account for less than 1% each of the total area mapped and combine for approximately 10% (16,379 ha [40,473 ac]) of the map (**Appendix C**). The most common thematic classes are Short Sawgrass Marsh-Dense and Graminoid Freshwater Prairie. These two classes account for 33.6% and 28.1% of the map, respectively. Mixed Graminoid Freshwater Marsh, Spikerush Marsh, and Tall Sawgrass Marsh-Dense are the next three dominant community types and combine for about 18% of the map (**Appendix C**).

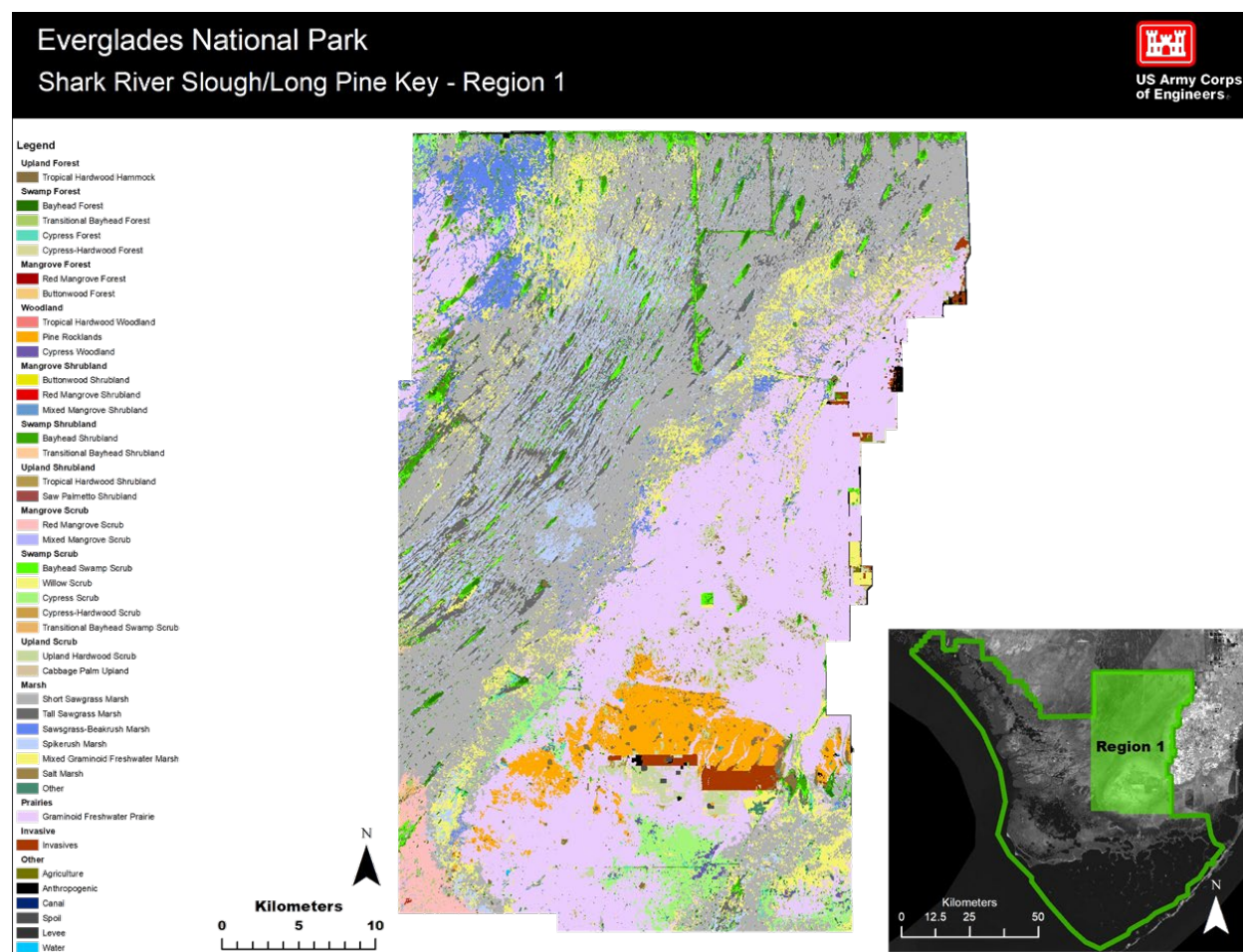
#### 3.1 Forest and Woodland Communities

Forests and Woodlands communities account for about 5.6% of the total area mapped within the Shark River Slough/Long Pine Key mapping area. Forested communities account for about 1.8% of the total area mapped (2,882 ha, **Table 2**) while Woodlands account for 3.9% (6,256 ha, **Table 3**).

Forest communities within Shark River Slough/Long Pine Key, Region 1, are comprised of three communities: Swamp Forest (1,475 ha), Hardwood Hammocks (1,405 ha), and Mangrove Forest (2.3 ha). Swamp Forest communities, including Bayhead Forests, Cypress Forests, and Transitional Bayhead Forests, are the most common Forest communities found within the mapping region (**Table 2**). However, as a single discrete community type, Tropical Hardwood Hammock, is the most common (1,405 ha). Mangrove Forests, comprised of Red Mangrove and Buttonwood Forests, are a minor component of the Region 1 landscape (< 0.01%).

Woodland communities consist of Pine Woodlands (5,755 ha), Swamp Woodlands (472 ha) and Upland Hardwood-Palm Woodlands (29 ha, **Table 3**). Pine Woodlands account for about 3.6% of the mapping area and are the dominant woodland community type. Swamp Woodlands, consisting of several classes of Cypress Woodlands, are the 2nd most dominant Woodland community type. However, they only account for about 0.3% of the area mapped. Upland Hardwood-Palm Woodlands are a minor component of the landscape comprising only 0.02% of Region 1.





**Figure 5. Generalized vegetation map of Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

**Table 2. Total area in hectares (ha) and acres (ac) and percent total area mapped of Forest community types within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
<b>Swamp Forest</b>	<b>Swamp Forest Total</b>	<b>1,474.8</b>	<b>3,644.2</b>	<b>0.91%</b>
	Bayhead Forest	862.0	2,130.0	0.53%
	Cypress Forest-Dome	83.0	205.1	0.05%
	Cypress Forest-Monotypic	334.8	827.2	0.21%
	Cypress Forest-Strand	5.5	13.6	< 0.01%
	Cypress-Hardwood Forest	1.8	4.3	< 0.01%
	Pond Apple Forest	12.5	30.9	0.01%
	Transitional Bayhead Forest	175.3	433.1	0.11%
<b>Hardwood Hammock</b>	<b>Hardwood Hammock Total</b>	<b>1,405.0</b>	<b>3,471.8</b>	<b>0.87%</b>
	Hardwood Hammock-Pine Forest	1.0	2.5	< 0.01%

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
	Tropical Hardwood Hammock	1,393.5	3,443.4	0.86%
	West Indian Mahogany Hammock	10.5	25.9	0.01%
<b>Mangrove Forest</b>	<b>Mangrove Forest Total</b>	<b>2.3</b>	<b>5.6</b>	<b>&lt; 0.01%</b>
	Buttonwood Forest	0.8	1.9	< 0.01%
	Red Mangrove Forest	1.5	3.7	< 0.01%
<b>Forest Total</b>	<b>-</b>	<b>2,882.0</b>	<b>7,121.6</b>	<b>1.8%</b>

**Table 3. Total area in hectares (ha) and acres (ac) and percent total area mapped of Woodland community types within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
<b>Pine Woodland</b>	<b>Pine Woodland Total</b>	<b>5,755</b>	<b>14,220.9</b>	<b>3.55%</b>
	Pine Lowland-Graminoid	0.5	1.2	< 0.01%
	Pine Lowland-Mixed	1.3	3.1	< 0.01%
	Pine Lowland-Shrubs	2	4.9	< 0.01%
	Pine Rockland-Graminoids	591	1,460.4	0.36%
	Pine Rockland-Mixed	1,690.3	4,176.7	1.04%
	Pine Rockland-Shrubs	3428	8,470.8	2.11%
	Pine Rockland-Saw Palmetto	42	103.8	0.03%
<b>Swamp Woodland</b>	<b>Swamp Woodland Total</b>	<b>471.5</b>	<b>1,165.1</b>	<b>0.29%</b>
	Cypress Woodland-Graminoid			
	Prairie	268.8	664.1	0.17%
	Cypress Woodland-Mixed	43.8	108.1	0.03%
	Cypress Woodland-Mixed			
	Graminoid Marsh	41.5	102.5	0.03%
	Cypress Woodland-Short Sawgrass			
	Marsh	53.0	131.0	0.03%
	Cypress Woodland-Shrubs	50.0	123.6	0.03%
	Cypress Woodland-Spikerush Marsh	0.3	0.6	< 0.01%
	Cypress Woodland-Tall Sawgrass			
	Marsh	11.3	27.8	0.01%
	Cypress-Pine Woodland-Mixed	0.5	1.2	< 0.01%
	Cypress-Pine Woodland-Mixed			
	Graminoid Marsh	2.0	4.9	< 0.01%
	Cypress-Pine Woodland-Sawgrass			
	Marsh	0.5	1.2	< 0.01%
<b>Upland Hardwood-Palm Woodland</b>	<b>Upland Hardwood-Palm Woodland Total</b>	<b>29.0</b>	<b>71.7</b>	<b>0.02%</b>
	Tropical Hardwood Woodland	29.0	71.7	0.02%

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
<b>Woodland Total</b>	-	<b>6,255.5</b>	<b>15,457.7</b>	<b>3.86%</b>

### 3.2 Shrubland Communities

Shrublands account for about 2.2% (3,513 ha) of the area mapped and consist of Swamp Shrublands (2,998 ha), Tropical Hardwood Shrublands (496 ha), Mangrove Shrublands (16 ha) and Saw Palmetto Shrublands (3 ha, **Table 4**). Swamp Shrublands are the dominant Shrubland community found within the Shark River Slough/Long Pine Key mapping area. They account for approximately 2% of the total area mapped. The dominant Swamp Shrubland community type is Bayhead Shrubland (1,713 ha) followed by Willow Shrubland (1,092 ha). Tropical Hardwood Shrublands are a minor component of the landscape as are Mangrove Shrublands and Saw Palmetto Shrublands (**Table 4**).

**Table 4. Total area in hectares (ha) and acres (ac) and percent total area mapped of Shrubland community types within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
<b>Swamp Shrubland</b>	<b>Swamp Shrubland Total</b>	<b>2,998.0</b>	<b>7,408.2</b>	<b>1.85%</b>
	Bayhead Shrubland	1,713.3	4,233.5	1.06%
	Buttonbush Shrubland	3.8	9.3	< 0.01%
	Cocoplum Shrubland	16.0	39.5	0.01%
	Dahoon Holly Shrubland	15.5	38.3	0.01%
	Falsewillow Shrubland	0.8	1.9	< 0.01%
	Pond Apple Shrubland	18.0	44.5	0.01%
	Transitional Bayhead Shrubland	138.3	341.6	0.09%
	Wax Myrtle Shrubland	0.8	1.9	< 0.01%
	Willow Shrubland	1,091.8	2,697.8	0.67%
<b>Tropical Hardwood Shrubland</b>	<b>Tropical Hardwood Shrubland Total</b>	<b>495.5</b>	<b>1,224.4</b>	<b>0.31%</b>
	Tropical Hardwood Shrubland	495.5	1,224.4	0.31%
<b>Mangrove Shrubland</b>	<b>Mangrove Shrubland Total</b>	<b>15.8</b>	<b>38.9</b>	<b>0.01%</b>
	Buttonwood Shrubland	0.3	0.6	< 0.01%
	Buttonwood-Red Mangrove Shrubland	6.0	14.8	< 0.01%
	Red Mangrove Shrubland	9.5	23.5	0.01%
<b>Saw Palmetto Shrubland</b>	<b>Saw Palmetto Shrubland Total</b>	<b>3.3</b>	<b>8.0</b>	<b>0.002%</b>
	Saw Palmetto Shrubland	3.3	8.0	< 0.01%
<b>Shrubland Total</b>	-	<b>3,512.5</b>	<b>8,679.6</b>	<b>2.17%</b>



### 3.3 Scrub Communities

Scrub communities account for 7.3% (11,816 ha) of the area mapped and consist of Swamp Scrub (7,113 ha), Upland Hardwood Scrub (2,911 ha), Mangrove Scrub (1,741 ha), Saw Palmetto Scrub (38 ha), and Cabbage Palm Upland Scrub (13 ha, **Table 5**). The Swamp Scrub community, consisting of 38 different community types, is the most diverse community grouping found within the Shark River Slough/Long Pine Key mapping area (**Table 5**). However, most community types, within this group, account for < 0.1% of the area mapped. The most common Swamp Scrub type, Cypress Scrub-Graminoid Prairie, accounts for just 1.43% (2,318 ha) of the area mapped. The dominant Scrub community type is Upland Hardwood Scrub-Graminoid Prairie. It accounts for about 1.8% of the area mapped (**Table 5**). Several Mangrove Scrub community types are present within the mapping region as well. However, like the Swamp Scrub types they account for < 0.1%, each, of the total area mapped. The same is true for the two palm dominated community types: Saw Palmetto Scrub-Graminoid Prairie and Cabbage Palm Upland-Graminoid Prairie. These two community types combine for 53 ha or about 0.03% of the total area mapped.

**Table 5. Total area in hectares (ha) and acres (ac) and percent total area mapped of Scrub community types within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
Swamp Scrub	<b>Swamp Scrub Total</b>	<b>7,113.3</b>	<b>17,577.2</b>	<b>4.38%</b>
	Bayhead Swamp Scrub-Cattail Marsh	11.0	27.2	0.01%
	Bayhead Swamp Scrub-Short Sawgrass Marsh	383.8	948.3	0.24%
	Bayhead Swamp Scrub-Spikerush Marsh	0.5	1.2	< 0.01%
	Bayhead Swamp Scrub-Tall Sawgrass Marsh	1,059.8	2,618.7	0.65%
	Bayhead Swamp Scrub-Mixed Graminoid Marsh	30.0	74.1	0.02%
	Buttonbush Scrub-Mixed Graminoid Marsh	1.3	3.1	< 0.01%
	Buttonbush Scrub-Short Sawgrass Marsh	17.3	42.6	0.01%
	Buttonbush Scrub-Tall Sawgrass Marsh	52.3	129.1	0.03%
	Cypress Scrub-Beakrush Marsh	1.3	3.1	< 0.01%
	Cypress Scrub-Cattail Marsh	0.5	1.2	< 0.01%
	Cypress Scrub-Graminoid Prairie	2,318.0	5,727.9	1.43%
	Cypress Scrub-Mixed Graminoid Marsh	616.5	1,523.4	0.38%
	Cypress Scrub-Short Sawgrass Marsh	1,170.0	2,891.1	0.72%
	Cypress Scrub-Spikerush Marsh	6.0	14.8	< 0.01%
	Cypress Scrub-Tall Sawgrass Marsh	53.8	132.8	0.03%

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
	Cypress-Hardwood Scrub-Graminoid Prairie	12.3	30.3	0.01%
	Cypress-Hardwood Scrub-Sawgrass Marsh	4.3	10.5	< 0.01%
	Dahoon Holly Scrub-Mixed Graminoid Marsh	44.3	109.3	0.03%
	Falsewillow Scrub-Herbaceous Marsh	5.5	13.6	< 0.01%
	Falsewillow Scrub-Mixed Graminoid Marsh	0.8	1.9	< 0.01%
	Pond Apple Scrub-Beakrush Marsh	10.3	25.3	0.01%
	Pond Apple Scrub-Mixed Graminoid Marsh	5.8	14.2	< 0.01%
	Pond Apple Scrub-Short Sawgrass Marsh	10.5	25.9	0.01%
	Pond Apple Scrub-Spikerush Marsh	0.3	0.6	< 0.01%
	Pond Apple Scrub-Tall Sawgrass Marsh	6.0	14.8	< 0.01%
	Transitional Bayhead Swamp Scrub-Short Sawgrass Marsh	15.0	37.1	0.01%
	Transitional Bayhead Swamp Scrub-Spikerush Marsh	0.5	1.2	< 0.01%
	Transitional Bayhead Swamp Scrub-Tall Sawgrass Marsh	54.8	135.3	0.03%
	Wax Myrtle Scrub-Graminoid Prairie	3.3	8.0	< 0.01%
	Wax Myrtle Scrub-Herbaceous Marsh	0.3	0.6	< 0.01%
	Willow Scrub-Cattail Marsh	130.8	323.1	0.08%
	Willow Scrub-Common Reed Marsh	1.0	2.5	< 0.01%
	Willow Scrub-Emergent Marsh	1.3	3.1	< 0.01%
	Willow Scrub-Herbaceous Marsh	3.0	7.4	< 0.01%
	Willow Scrub-Mixed Graminoid Marsh	56.3	139.0	0.03%
	Willow Scrub-Short Sawgrass Marsh	225.5	557.2	0.14%
	Willow Scrub-Spikerush Marsh	0.3	0.6	< 0.01%
	Willow Scrub-Tall Sawgrass Marsh	800.0	1,976.8	0.49%
<b>Upland Hardwood Scrub</b>	<b>Upland Hardwood Scrub Total</b>	<b>2,910.8</b>	<b>7,192.6</b>	<b>1.79%</b>
	Upland Hardwood Scrub-Graminoid Prairie	2,910.8	7,192.6	1.79%
<b>Mangrove Scrub</b>	<b>Mangrove Scrub Total</b>	<b>1,740.5</b>	<b>4,300.9</b>	<b>1.07%</b>
	Buttonwood-Red Mangrove Scrub-Dominant	13.5	33.4	0.01%

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
	Buttonwood-Red Mangrove Scrub-Open Marsh	23.5	58.1	0.01%
	Red Mangrove Scrub-Black Rush Marsh	0.3	0.6	< 0.01%
	Red Mangrove Scrub-Cattail Marsh	0.8	1.9	< 0.01%
	Red Mangrove Scrub-Dominant Red Mangrove Scrub-Mixed Graminoid Marsh	373.8	923.6	0.23%
	Red Mangrove Scrub-Open Marsh	1.8	4.3	< 0.01%
	Red Mangrove Scrub-Short Sawgrass Marsh	759.5	1,876.8	0.47%
	Red Mangrove Scrub-Spikerush Marsh	388.8	960.6	0.24%
	Red Mangrove Scrub-Tall Sawgrass Marsh	174.8	431.8	0.11%
		4.0	9.9	< 0.01%
<b>Saw Palmetto Scrub</b>	<b>Saw Palmetto Scrub Total</b>	<b>38.0</b>	<b>93.9</b>	<b>0.02%</b>
	Saw Palmetto Scrub-Graminoid Prairie	38.0	93.9	0.02%
<b>Cabbage Palm Upland Scrub</b>	<b>Cabbage Palm Upland Scrub Total</b>	<b>13.0</b>	<b>32.1</b>	<b>0.01%</b>
	Cabbage Palm Upland Scrub-Graminoid Prairie	13.0	32.1	0.01%
<b>Grand Total</b>	<b>-</b>	<b>1,1815.5</b>	<b>29,196.7</b>	<b>7.28%</b>

### 3.4 Marsh Communities

Marshes are the dominant community within the Shark River Slough/Long Pine Key mapping area. Marshes account for 135,786 ha (84%) of the mapping area and consist of Graminoid Freshwater Marshes (89,544 ha), Graminoid Freshwater Prairie (45,899 ha), Floating Emergent Marsh (177 ha), Open Freshwater Marsh (154 ha), Broadleaf Emergent Marsh (6 ha), Herbaceous Freshwater Marsh (2 ha), Mixed Graminoid-Broadleaf Freshwater Marsh (3 ha), and Graminoid Salt Marsh (0.3 ha) (**Table 6**). Graminoid Freshwater Marshes are the dominant marsh community present within the mapping region. They account for over 50% of the area mapped and consist of 12 discrete community types (**Table 6**). Short Sawgrass Marsh-Dense is the dominant community type (54,551 ha) followed by Mixed Graminoid Freshwater Marsh (12,162 ha). Graminoid Freshwater Prairies total 45,899 ha and are the second most abundant community type found within the Shark River Slough/Long Pine Key mapping area. Waterlily Marshes account for about 0.1% of the mapping area and are found scattered, in small pockets, throughout the northeastern and central portions of Shark River Slough. The remaining marsh communities (Open Freshwater Marsh, Broadleaf Emergent Marsh, Herbaceous Freshwater Marsh, Mixed Graminoid-Broadleaf Freshwater Marsh, and Graminoid Salt Marsh) account for 0.1% of the total area mapped (**Table 6**).

**Table 6. Total area in hectares (ha) and acres (ac) and percent total area mapped of Marsh community types within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Community	Community Type	Area (ha)	Area (Ac)	Percent Area Mapped
<b>Graminoid Freshwater Marsh</b>	<b>Graminoid Freshwater Marsh Total</b>	<b>89,544.3</b>	<b>221,268.6</b>	<b>55.2%</b>
	Beakrush Marsh	425.5	1,051.4	0.26%
	Cattail Marsh	222.0	548.6	0.14%
	Common Reed Marsh	1.0	2.5	< 0.01%
	Mixed Graminoid Freshwater Marsh	12,162.0	30,053.0	7.50%
	Panicgrass Marsh	1.3	3.1	< 0.01%
	Sawgrass-Black Rush Marsh	0.8	1.9	< 0.01%
	Sawgrass-Beakrush Marsh	4,471.5	11,049.3	2.76%
	Short Sawgrass Marsh-Dense	54,550.8	134,797.8	33.63%
	Short Sawgrass Marsh-Sparse	711.0	1756.9	0.44%
	Spikerush Marsh	8,565.0	21,164.6	5.28%
	Tall Sawgrass Marsh-Dense	8,390.3	207,32.8	5.17%
	Tall Sawgrass Marsh-Sparse	43.3	106.9	0.03%
<b>Graminoid Freshwater Prairie</b>	<b>Graminoid Freshwater Prairie Total</b>	<b>45,898.5</b>	<b>113,417.7</b>	<b>28.29%</b>
	Black Sedge Prairie	248.8	614.7	0.15%
	Graminoid Freshwater Prairie	45,649.8	112,803.0	28.14%
<b>Floating Emergent Marsh</b>	<b>Floating Emergent Marsh Total</b>	<b>177.3</b>	<b>438.0</b>	<b>0.109%</b>
	Spatterdock	10.3	25.3	< 0.01%
	Waterlily Marsh	167.0	412.7	0.10%
<b>Open Freshwater Marsh</b>	<b>Open Freshwater Marsh Total</b>	<b>154.3</b>	<b>381.2</b>	<b>0.10%</b>
<b>Broadleaf Emergent Marsh</b>	<b>Broadleaf Emergent Marsh Total</b>	<b>5.8</b>	<b>14.2</b>	<b>&lt; 0.01%</b>
	Broadleaf Emergent Marsh	5.8	14.2	< 0.01%
<b>Herbaceous Freshwater Marsh</b>	<b>Herbaceous Freshwater Marsh Total</b>	<b>2.3</b>	<b>5.6</b>	<b>&lt; 0.01%</b>
<b>Mixed Graminoid-Broadleaf Freshwater Marsh</b>	<b>Mixed Graminoid-Broadleaf Freshwater Marsh Total</b>	<b>3.3</b>	<b>8.0</b>	<b>&lt; 0.01%</b>
<b>Graminoid Salt Marsh</b>	<b>Graminoid Salt Marsh Total</b>	<b>0.3</b>	<b>0.6</b>	<b>&lt; 0.01%</b>
	Black Rush Marsh	0.3	0.6	< 0.01%
<b>Grand Total</b>	<b>-</b>	<b>135,785.8</b>	<b>335,533.9</b>	<b>83.70%</b>

### 3.4.1 Cattail

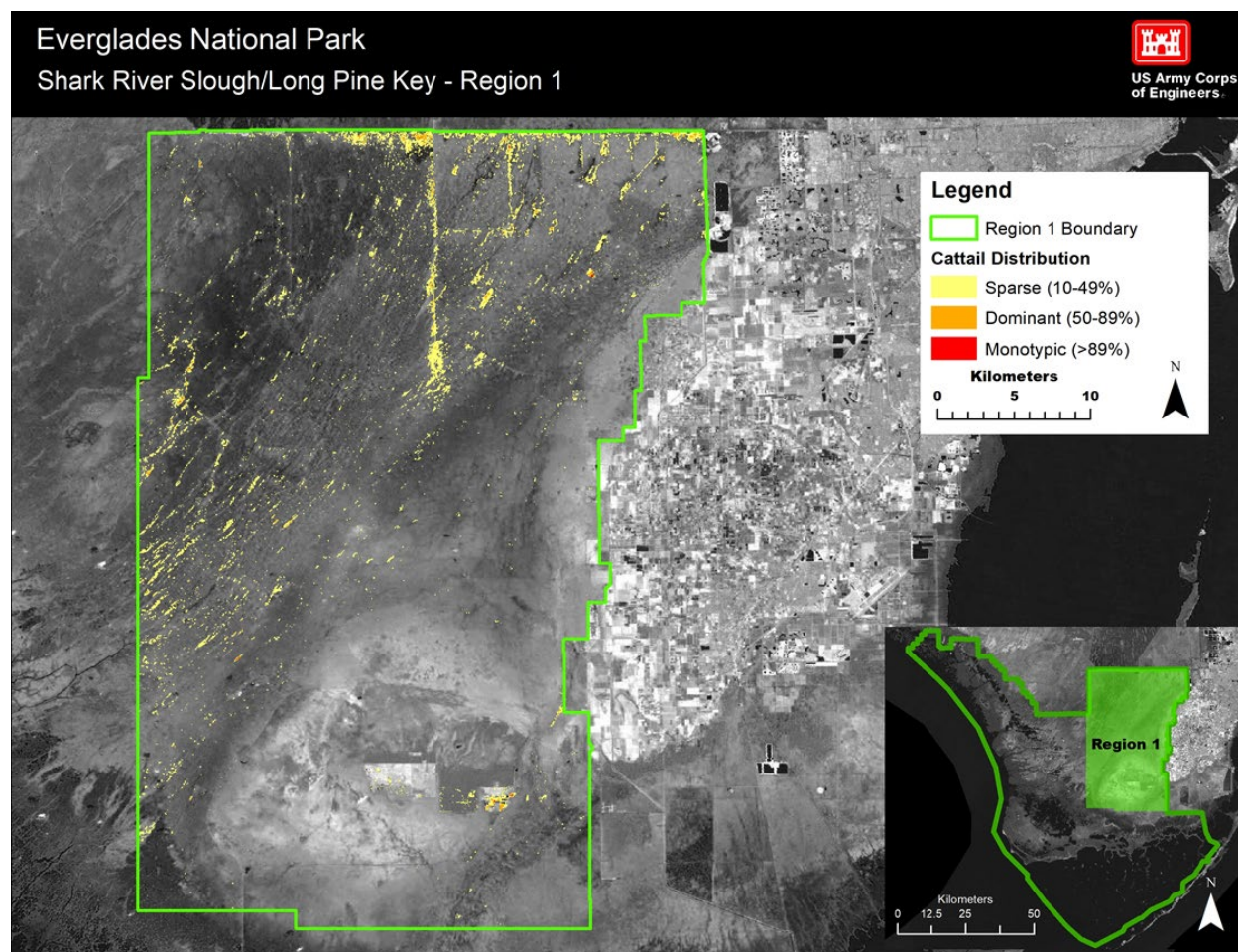
Cattail (*Typha* spp.) cover was estimated for each quarter-hectare grid mapping cell and assigned one of four possible categories (**Figure 6**), including:

1. Monotypic: greater than or equal to 90% cattail cover within the grid mapping cell.
2. Dominant: 50-89% cattail cover within the grid mapping cell.
3. Sparse: 10-49% cattail cover within the grid mapping cell.
4. No designation: less than 10% visible cattail cover within the grid mapping cell.

Greater than 10% cattail occupied 4,642.3 ha (2.8%) of the Shark River Slough/Long Pine Key mapping area. Most of the cattail in Region 1, 4,353.5 ha, was of the sparse variety (10-49% cover). Dominant cattail (50-89% cover) comprised 277.5 ha (0.17%) of the mapping region, and monotypic cattail ( $\geq 90\%$  cover) was found in only 11.3 ha or in less than 0.01% of the landscape (**Table 7**).

**Table 7. Total area in hectares (ha) and acres (ac) and percent total area mapped of Cattail within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

% Cover Cattail	Area (ha)	Area (Ac)	Percent Area Mapped
No designation (< 10%)	157,586.25	389,404.1	97.14%
Sparse (10-49%)	4,353.50	10,757.7	2.68%
Dominant (50-89%)	277.50	685.7	0.17%
Monotypic ( $\geq 90\%$ )	11.25	27.8	< 0.01%
<b>Grand Total</b>	<b>162,228.5</b>	<b>400,875.3</b>	<b>100%</b>



**Figure 6. Distribution map and density of cattail (*Typha* spp.) within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

### 3.5 Invasive Exotics

Several invasive plant species were encountered within the Shark River Slough/Long Pine Key mapping area (**Table 8**). These species occupied about 2,793 ha (1.7% of the total area mapped) and consisted of Brazilian pepper (*Schinus terebinthifolius*), Australian Pine (*Casuarina* spp.), Melaleuca (*Melaleuca quinquenervia*), and giant invasive grasses such as Burmameed (*Neyraudia renaudiana*). Brazilian pepper accounts for 1,870 ha (1.2%) of the mapped area. However, most of its infestation is associated with the Hole-in-the-Donut<sup>2</sup> restoration site (**Figure 7**). The infestation density, per grid-cell, for Brazilian Pepper was generally between 50-89% (1,014 ha). However, monotypic stands with greater than 89% infestation density were documented for approximately 15 ha. The infestation of Australian Pine was limited to 169 ha along the northeast park boundary at the urban interface (**Figure 8**). Australian Pine infestation densities were generally less than 50% of the grid mapping cell. Melaleuca occupies about 542 ha (0.33%) of the area mapped and was restricted to Northeast Shark River Slough at the urban interface (**Figure 9**).

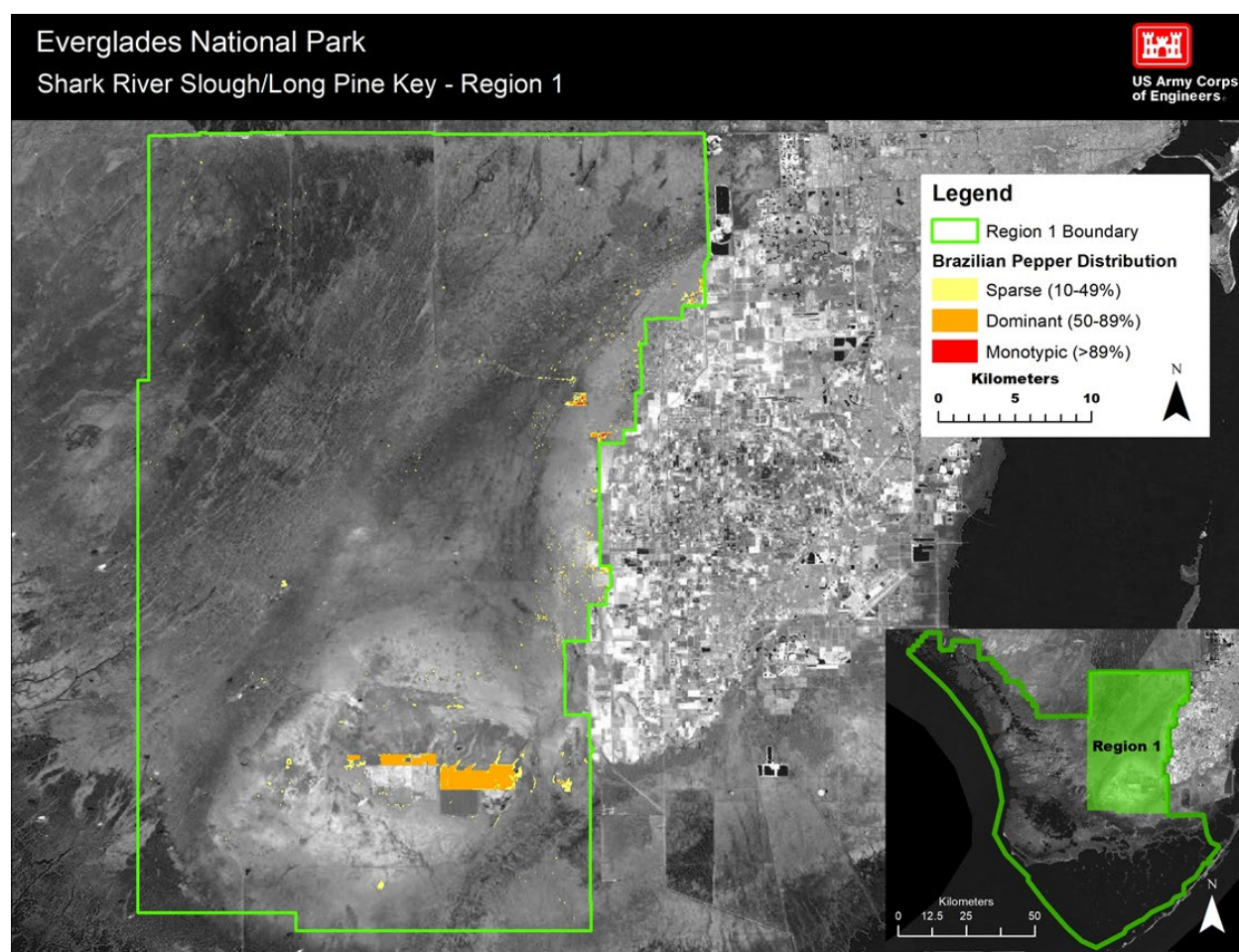
<sup>2</sup> At the time of this publication, restoration efforts in the Hole-in-the-Donut have removed most of the Brazilian Pepper reported in this region of the map.



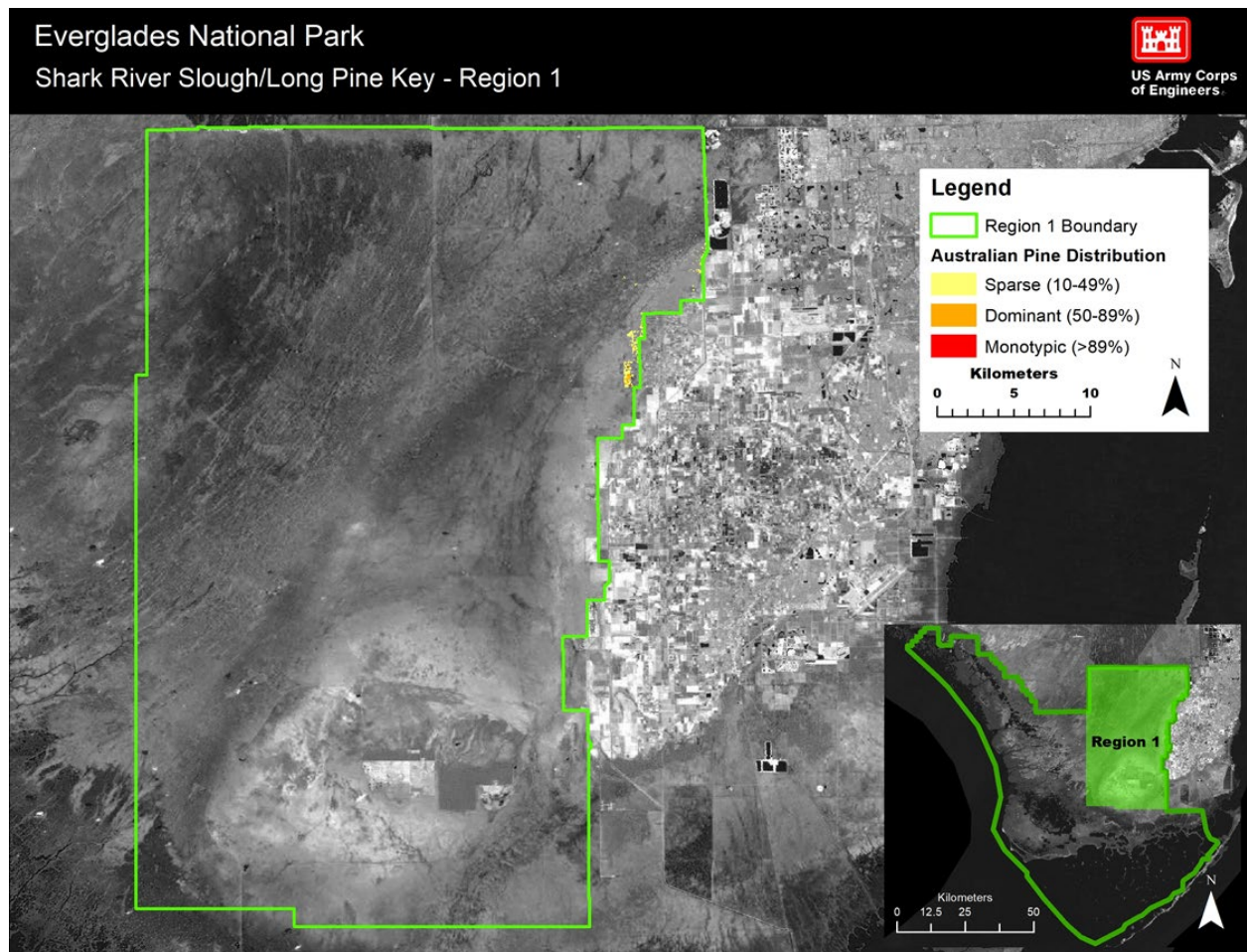
Infestation density of *Melaleuca*, like that of Australian Pine, was generally below 50%. Invasive giant grasses, consisting primarily of Burmese reed, accounted for 212 ha of the area mapped (Table 8).

**Table 8. Total area in hectares (ha) and percent total area mapped of Invasive species within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

Invasive Species	Sparse (10-49%) Area (ha)	Dominant (50-89%) Area (ha)	Monotypic (≥90%) Area (ha)	Total Area (ha)	Percent Area Mapped
Australian Pine	147.75	21.0	0.25	169.0	0.10%
Melaleuca	483.5	37.25	21.5	542.25	0.33%
Brazilian Pepper	841.25	1,013.75	14.5	1,869.5	1.15%
Giant Grasses	145.0	58.25	8.5	211.75	0.13%
<b>Grand Total</b>	<b>1,617.5</b>	<b>1,130.25</b>	<b>44.75</b>	<b>2,792.5</b>	<b>1.71%</b>



**Figure 7. Distribution map and density of Brazilian pepper (*Schinus terebinthifolius*) within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**



**Figure 8. Distribution map and density of Australian pine (*Casuarina* spp.) within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**



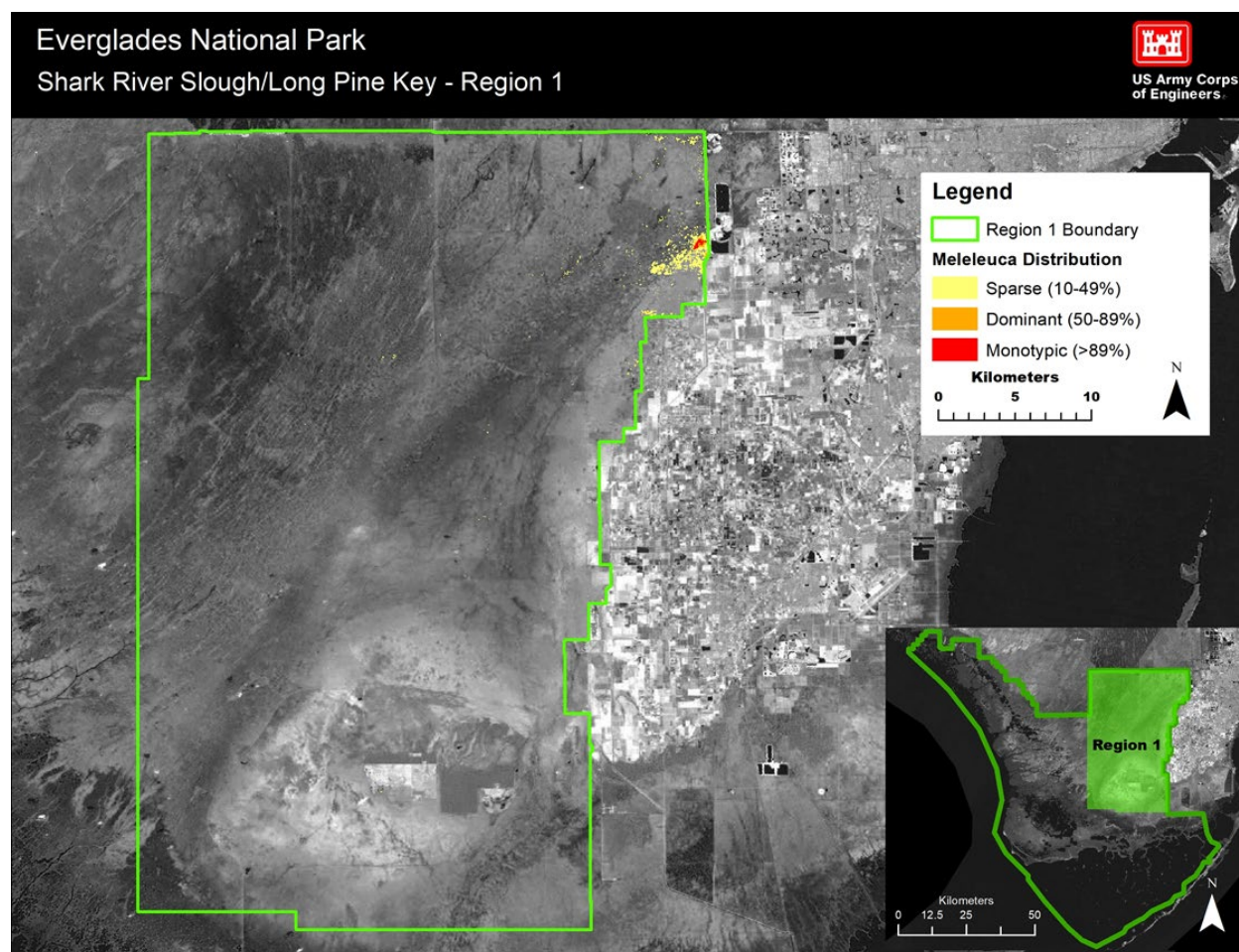


Figure 9. Distribution and density of *Melaleuca (Melaleuca quinquenervia)* within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.

### 3.6 Anthropogenic and Non-vegetative Classes

Anthropogenic and Non-vegetative classes account for approximately 0.5% of the total mapping area (Table 9). Anthropogenic features, like roads, buildings, and campgrounds, account for most of this area (0.46%). Non-vegetative classes, specifically open water, accounted for 0.02% of the area mapped.

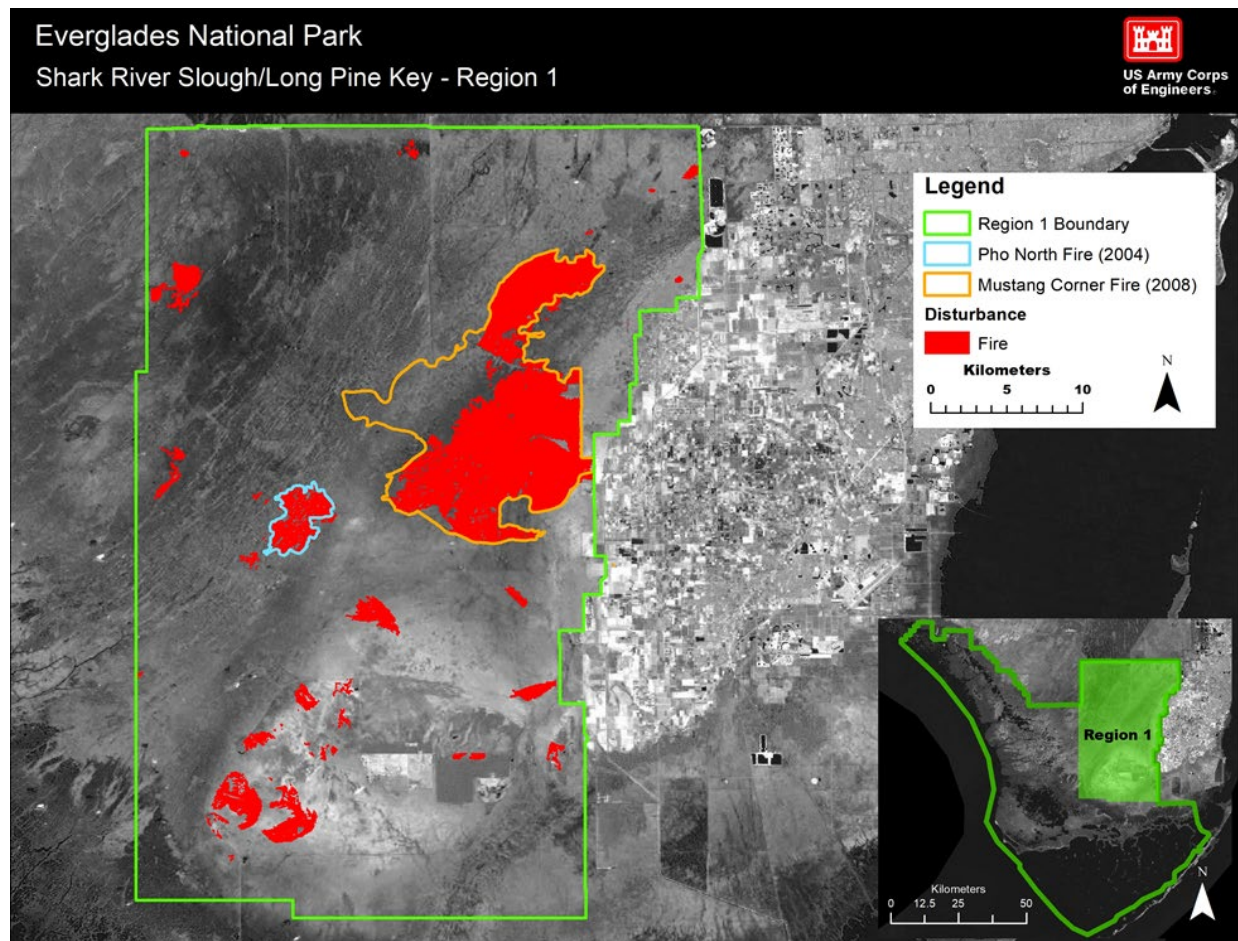
Table 9. Total area in hectares (ha) and acres (ac) and percent total area mapped of Anthropogenic and Non-Vegetative classes within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park.

Class	Class Type	Area (ha)	Area (Ac)	Percent Area Mapped
Anthropogenic	<b>Anthropogenic Total</b>	<b>739</b>	<b>1,826.1</b>	<b>0.46%</b>
	Agriculture	59	145.8	0.04%
	Anthropogenic	464.75	1,148.4	0.29%
	Canal	44	108.7	0.03%
	Levee	93.5	231.0	0.06%
	Spoil	61.75	152.6	0.04%

Class	Class Type	Area (ha)	Area (Ac)	Percent Area Mapped
Non-Vegetative	Trails	16	39.5	0.01%
	<b>Non-Vegetative Total</b>	<b>35.5</b>	<b>87.7</b>	<b>0.02%</b>
	Water	35.5	87.7	0.02%
<b>Grand Total</b>	-	<b>774.5</b>	<b>1,913.8</b>	<b>0.48%</b>

### 3.7 Disturbance

Over 20 fire scars covering 15,920 ha (39,339 Ac) were detected on the 2009 imagery (**Figure 10**). Most fires were restricted to the eastern marl prairies of the park. However, a few fire scars were observed in Shark River Slough and in the western prairies. Based on the fire perimeter records of Everglades National Park, these fires occurred between 2004 and 2008. In some cases, the fire scar observed on the 2009 imagery tended to be smaller than the actual fire perimeter. For example, the area burned by the 2008 Mustang Corner fire was much larger than the fire scar observed on the 2009 imagery (**Figure 10**). However, in most instances, like the Pho North fire, the fire scar observed on the imagery is nearly identical to the fire perimeter established five years earlier.



**Figure 10. Distribution map of visible fire scars within Shark River Slough/Long Pine Key, Region 1, Everglades National Park.**

### 3.8 Accuracy Assessment

An exact one-to-one match between the Accuracy Assessment points (AA) and the vegetation map occurred for 75 of the 290 AA points selected (**Appendix D**). The 215 grid cells that did not have a one-to-one correlation were re-examined to determine whether they could be deemed acceptable based on the conditions described in the methods section. This secondary assessment yielded an additional 185 matching points, increasing the total number of acceptable points to 260. Most points were deemed acceptable because: 1) they were at the height cutoff boundary between two similar classes, e.g., Short Bayhead Shrubland vs. Bayhead Forest; 2) the AA point was more detailed than the map class, e.g., Muhly Grass Prairie vs. Graminoid Freshwater Prairie; or 3) the map class was incorrect at a more detailed level (Level 5) but correct at a less detailed level (Level 4). This was the case for the Pine Rockland class where only 4 out of the 16 AA points had a one-to-one match at Level 5, which includes a description of the understory vegetation. These points were deemed acceptable because they were correctly classified as Pine Rocklands, a Level 4 classification, but incorrect at Level 5, indicating a mismatch within the understory description.

Based on the total number of accepted AA points (260), the accuracy of the Region 1 vegetation map, regardless of categorical level, is 89.7% with a lower 90th percentile confidence interval of 86.2%. Vegetation class Level accuracy was above 92% for all class levels except Level 4 (88.6%), Levels 7 (83.3%), and Level 8 (83.3%, **Table 10**). The assessment of three Level 9 vegetation classes (Cypress-Hardwood Scrub-Short Sawgrass Marsh-Dense, Cypress-Hardwood Scrub-Tall Sawgrass Marsh Dense, & Cypress-Pine Woodland-Short Sawgrass Marsh-Dense) was not possible because there were no corresponding Accuracy Assessment points available within these classes.

**Table 10. Results of the accuracy assessment for each level in the classification system.**

<b>Classification Level</b>	<b>Number of Points Acceptable</b>	<b>Number of AA Points</b>	<b>Percent Correct</b>	<b>Lower 90th Percentile Confidence Interval</b>
Level 1	276	290	95.2%	92.6%
Level 2	274	290	94.5%	91.7%
Level 3	267	289	92.4%	89.3%
Level 4	203	229	88.6%	84.6%
Level 5	128	138	92.8%	88.0%
Level 6	103	109	94.5%	89.4%
Level 7	5	6	83.3%	41.8%
Level 8	5	6	83.3%	41.8%
Level 9	-	-	-	-
<b>Overall</b>	<b>260</b>	<b>290</b>	<b>89.7%</b>	<b>87.0%</b>

Out of the 134 total thematic classes utilized within Region 1, 27 (20%) could be verified with at least one AA point. However, most classes, 20 out of the 27 classes evaluated (74%), were assessed with fewer than ten AA points. The 27 classes evaluated account for 96.6% of the total map area. Thematic class accuracy for these classes ranged from 100% to 33% with most classes (20 out of 27, 74%) having a class accuracy of 81% or greater. Seven classes were found to have a class accuracy of less than 80% (Table 11).

**Table 11. Number of accuracy assessment locations, class accuracy, and percent map area for all the accuracy assessment points visited within the Shark River Slough/Long Pine Key, Region 1, Everglades National Park. See Appendix D for breakdown of one-to-one vs. acceptable classes for each assessed class.**

Vegetation Class	Number of AA Points	Class Accuracy (%)	Percent Map Area
Short Sawgrass Marsh-Dense (MFGcSD)	83	98.8%	33.6%
Graminoid Freshwater Prairie (MFGP)	68	85.3%	28.1%
Mixed Graminoid Freshwater Marsh (MFGX)	30	93.3%	7.5%
Spikerush Marsh (MFGe)	16	81.3%	5.3%
Tall Sawgrass Marsh-Dense (MFGcTD)	15	86.7%	5.2%
Tropical Hardwood Hammock (FHS)	15	93.3%	0.9%
Pine Rockland-Shrubs (WUpRS)	11	90.9%	2.1%
Bayhead Forest (FSB)	9	88.9%	0.5%
Upland Hardwood Scrub-Graminoid Prairie (CUWGP)	6	66.7%	1.8%
Sawgrass-Beakrush Marsh (MFGXcr)	5	100.0%	2.8%
Cypress Scrub-Graminoid Prairie (CStGP)	4	75.0%	1.4%
Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense (CSBGcTD)	3	33.3%	0.7%
Pine Rockland-Mixed (WUpRX)	3	66.7%	1.0%
Short Sawgrass Marsh-Sparse (MFGcSS)	2	50.0%	0.4%
Bayhead Shrubland (SSB)	2	100.0%	1.1%
Cypress Scrub-Short Sawgrass Marsh-Dense (CStGcSD)	2	50.0%	0.7%
Willow Shrubland (SSs)	2	100.0%	0.7%
Pine Rockland-Graminoids (WUpRG)	2	100.0%	0.4%
Beakrush Marsh (MFGGr)	2	100.0%	0.3%
Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense (CSBGcSD)	2	100.0%	0.2%
Red Mangrove Scrub-Spikerush Marsh (CMrGe)	2	50.0%	0.1%
Brazilian Pepper (Es)	1	100.0%	0.7%
Cypress Scrub-Mixed Graminoid Marsh (CStGX)	1	100.0%	0.4%

<b>Vegetation Class</b>	<b>Number of AA Points</b>	<b>Class Accuracy (%)</b>	<b>Percent Map Area</b>
Tropical Hardwood Shrubland (SUH)	1	100.0%	0.3%
Red Mangrove Scrub-Dominant (CMrD)	1	100.0%	0.2%
Cypress Woodland-Graminoid Prairie (WStGP)	1	100.0%	0.8%
Willow Scrub-Short Sawgrass Marsh-Dense (CSsGcSD)	1	100.0%	0.1%

## 4 Conclusion

The accuracy of the Shark River Slough/Long Pine Key, Region 1, vegetation map is estimated at 89.7% with a lower 90th percentile confidence interval of 86.2%. Many of the thematic classes assessed, regardless of the number of Accuracy Assessment points, had an estimated accuracy greater than 81%. The few classes that did not, were evaluated by six or fewer assessment points each. The overall accuracy of this map is similar to the estimated accuracies of the previous vegetation maps produced for Everglades National Park as part of this project: Region 2 – the Southeast Saline Everglades (Ruiz et al. 2017); Region 3 – the Southwest Coastal Everglades (Ruiz et al. 2018); and Region 4 – the Northwest Coastal Everglades (Ruiz et al. 2020).

This vegetation map and report is the fourth of four regional maps for Everglades National Park. It marks the completion of the RECOVER, USACE, and NPS vegetation mapping effort in Everglades National Park and Big Cypress National Preserve. The Southeast Saline Everglades, Region 2, Southwest Coastal Everglades, Region 3, The Northwest Coastal Everglades, Region 4, and eastern Big Cypress, Regions 5 and 6, vegetation maps are complete and available for download from the NPS Integrated Resource Management Applications Data Store (<https://irma.nps.gov/Portal/>). The western Big Cypress, Region 7, vegetation map is pending publication.

This vegetation map of Shark River Slough/Long Pine Key, Region 1, serves as a baseline of plant communities within Everglades National Park for 2009, prior to the implementation of CERP. The map provides land-cover information for National Park Service managers and scientists for use in park management, resource management, research, and monitoring. Furthermore, this map and the other regional maps in this series provide a cost-effective mechanism by which researchers can track and document the rate and direction of vegetation change resulting from natural successional processes, disturbance events, sea level rise, and/or management decisions, by allowing for the systematic monitoring of individual grid-cells overtime.

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## Appendix A. Summary of Geospatial Products

This report and the corresponding geospatial products for the Shark River Slough/Long Pine Key, Region 1, vegetation map are available from USACE, Jacksonville District (**RECOVER**). In addition, a digital copy of this report and the geospatial map data can be obtained by contacting the author.

The geospatial data created for this project are represented by two-dimensional features stored in an ESRI ArcGIS v10.5 personal geodatabase and are referenced to the Universal Transverse Mercator (UTM) Zone 17N, North American Datum of 1983 (NAD83). The geospatial product consists of seven feature classes and one raster mosaic dataset, including:

- *SRS\_LPK\_Region1\_Boundary*
- *SRS\_LPK\_Region1\_Cattails*
- *SRS\_LPK\_Region1\_Disturbance*
- *SRS\_LPK\_Region1\_Invasives*
- *SRS\_LPK\_Region1\_Land*
- *SRS\_LPK\_Region1\_Vegetation*
- *SRS\_LPK\_Region1\_Vegetation\_Dissolve*
- *SRS\_LPK\_Region1\_CERP2009\_Image*

The *SRS\_LPK\_Region1\_Boundary* feature class contains one record delineating the mapping boundary for the Shark River Slough/Long Pine Key (SRS\_LPK), Region 1, vegetation map. The *SRS\_LPK\_Region1\_Cattails* feature class shows the distribution of cattails (*Typha* spp.) throughout Region 1 and quantifies the absolute cover of cattails within each grid cell as either Sparse (10-49%), Dominant (50-89%), or Monotypic ( $\geq 90\%$ ). Blank grid cells indicate that cattails were either not present within the grid cell or below the minimum detectable threshold value of ten percent. The *SRS\_LPK\_Region1\_Disturbance* feature class documents any evidence of disturbance as either anthropogenic, fire, or treatment (invasive species management). Blank grid cells indicate that the grid cell showed no evidence of disturbance. The *SRS\_LPK\_Region1\_Exotics* feature class shows the distribution of Brazilian pepper (*Schinus terebinthifolius*), Australian Pine (*Casuarina* spp.), Melaleuca (*Melaleuca quinquenervia*), and Giant exotic grasses, including Napier Grass (*Pennisetum purpureum*) or Silkreed (*Neyraudia reynaudiana*), throughout Region 1 and quantifies the absolute cover of these species within each grid cell as either Sparse (10-49%), Dominant (50-89%), or Monotypic ( $\geq 90\%$ ). Blank grid cells indicate that an invasive exotic species was either not present or below the minimum detectable threshold value of ten percent. The *SRS\_LPK\_Region1\_Land* feature class contains one record delineating the terrestrial portion (land area) of the mapping region. The *SRS\_LPK\_Region1\_Vegetation* feature class contains the majority vegetation classification for each grid mapping cell within Region 1. It contains 648,914 records and 19 attributes (**Table A-1**). The attributes represent grid cell specific information regarding the majority community type identified. The *SRS\_LPK\_Region1\_Vegetation\_Dissolve* represent the same vegetation information stored in the previously described feature class; however, adjacent grid mapping cells with identical vegetation classifications were merged (dissolved) to reduce the number of total records to 134 (unique vegetation classes) and to speed up the geoprocessing time needed to load the Region 1 vegetation map for display purposes. The *CERP2009\_Image* is a two-meter spatial resolution image mosaic of the mapping area created from the same 2009 aerial imagery used in creation of the vegetation map. This raster mosaic is managed within the geodatabase.



**Table A-1: Description of attributes in the *SRS\_LPK\_Region1\_Vegetation* feature class**

<b>Attribute</b>	<b>Description</b>
OBJECTID	ESRI default identifier (ID)
SHAPE	ESRI geometry type (polygon)
Cell_ID	Unique identifier assigned to each grid mapping cell.
VegCode	Vegetation code from the classification system.
VegCode Level	Indicates the level of detail (hierarchy) associated with the vegetation code within the classification system. Community specificity increases with increasing level of detail.
Name	The long name associated with the vegetation code (VegCode) attribute (see classification system).
L1_name	Level 1 classification name (see classification system).
L2_name	Level 2 classification name (see classification system).
L3_name	Level 3 classification name (see classification system).
L4_name	Level 4 classification name (see classification system).
L5_name	Level 5 classification name (see classification system).
L6_name	Level 6 classification name (see classification system).
L7_name	Level 7 classification name (see classification system).
L8_name	Level 8 classification name (see classification system).
L9_name	Level 9 classification name (see classification system).
Area_Ha	Area in hectares for each grid mapping cell.
Area_Ac	Area in acres for each grid mapping cell.
Shape_Length	ESRI default (shape perimeter in units of meters)
Shape_Area	ESRI default (shape area in units of m <sup>2</sup> )

## **Appendix B. Vegetation Classification Key for the Shark River Slough/Long Pine Key, Region 1, Vegetation Map of Everglades National Park**



**Version R1-2020.0901**

**On the Cover**

Aerial view of Shark River Slough, Everglades National Park, depicting a tree island-ridge-slough landscape mosaic. Photo credit Pablo L Ruiz (29 March 2013).

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## Introduction

This vegetation classification key was designed to be used in the Everglades National Park (EVER) and Big Cypress National Preserve (BICY) vegetation mapping project to help photo-interpreters determine the appropriate vegetation class within each quarter-hectare grid mapping cell, the minimum mapping unit (MMU) for this project. This key is modeled after the Vegetation Classification System for South Florida Natural Areas v6.15.09 (Rutchev et al. 2006) which was developed and used to map wetland and upland plant communities in other regions of the Everglades (Rutchev et al. 2008). The classification key presented herein differs from its parent system in several ways: 1) the hierarchical pathway has been modified to help photo-interpreters consistently reach the same vegetation class and reduce photo-interpreter variability; 2) vegetation class definitions have been modified to clarify meaning and to reflect regional differences in species composition; and 3) vegetation classes not occurring within the mapping area have been removed while region-specific vegetation classes have been added.

It is expected that users of this key will be familiar with most, if not all, of the plant species listed herein and have a general knowledge of the vegetation communities and their general distribution within EVER and BICY. It is expected that all users will have comparable abilities to estimate vegetation cover and height accurately and precisely within the MMU. Discrepancies of  $\pm 5\%$  in vegetation cover and height estimates are considered acceptable between photo-interpreters and when comparing field established classification data with classifications determined from the aerial imagery.

This key is a work in progress. A photo-interpreter should confirm the final keyed answer by reading the vegetation class description and determining whether the answer is plausible. If it is not, the photo-interpreter should revise the answer by examining other possible pathways in the key based on their best professional judgment, geographic context, and on the structural and spectral information available. This key should be used hand-in-hand with the photo-interpreter's key, a tool similar to this key but specifically designed to assist in the photo-interpretation of vegetation communities directly from aerial photography based on a community's specific spectral and structural signature.



## Glossary

**Cover (absolute):** The relative area covered by a plant or a community expressed as a percentage of the total area it occupies within a region of finite size. The absolute cover for all species present shall always add up to 100%.

**Cover (density):** The percentage of the area being classified that is occupied by an individual plant species or multiple plant species.

**Co-dominant (mixed):** Two or more species that are equally distributed throughout a region of finite size with no significant difference in their absolute cover.

**Dominant (dominated by):** The individual species having the highest cover of any species within the area being classified.

**Dominant:** Species cover between 50-89%. This term is typically used to classify cattail and exotic species cover.

**Graminoids:** Grasses and grass-like plant species such as sedges and rushes.

**Herbaceous:** Non-woody vascular plants species (graminoids excluded) typically persisting for only one growing season.

**Monotypic:** Species cover 90-100%. This term is typically used to classify cattail and exotic species cover.

**Tree:** Woody plant that is at least 5 meters tall.

**Shrub:** Woody plant that is shorter than 5 meters.

**Sparse:** Species cover 10-49%. This term is typically used to classify cattail and exotic species cover.

**Uplands:** Rarely flooded communities consisting of semi-flood-tolerant or flood-intolerant plant species.

**Wetlands:** Regularly flooded communities consisting of flood-tolerant plant species.

## L1 – Forest (F)

Stands of trees (5 meters or taller) that are of high density (50-100% cover).

### L2 – Wetland Forest (FW)

Regularly flooded forest consisting of flood tolerant tree species. Most common forest type found in the Everglades.

#### L3 – Mangrove Forest (FM)

Regularly flooded forests consisting of salt tolerant tree species. These communities are typically found along saltwater shorelines, interior tidal rivers and creeks, or estuarine zones.

##### L4 – Buttonwood Forest (FMc)

Buttonwood (*Conocarpus erectus*) dominant forest. This community is usually characterized by a minimum of 50% Buttonwood (*C. erectus*) trees and shrubs found in a matrix of other species.

##### L4 – Red Mangrove Forest (FMr)

Red Mangrove (*Rhizophora mangle*) dominant forest. This community is usually characterized by a minimum of 50% Red Mangrove (*R. mangle*) trees found in a matrix of other species.

### L3 – Swamp Forest (FS)

Seasonally to semi-permanently flooded freshwater forests primarily found in interior wetlands but may extend well into coastal areas.

##### L4 – Pond Apple Forest (FSa)

Pond-Apple (*Annona glabra*) dominant forest. This community is usually characterized by a minimum of 50% Pond-Apple (*A. glabra*) trees.

##### L4 – Bayhead Forest (FSB)

Mix of several tree species characterized by Cocoplum (*Chrysobalanus icaco*), Dahoon Holly (*Ilex cassine*), Willow (*Salix caroliniana*), Wax Myrtle (*Morella cerifera*), Sweetbay (*Magnolia virginiana*), Pond Apple (*Annona glabra*), Red Bay (*Persea borbonia*), and Swamp Bay (*Persea palustris*). Cypress (*Taxodium* spp.) and Buttonwood (*Conocarpus erectus*) may be present but do not significantly contribute to overall canopy cover (typically < 20%). Buttonwood cover above 30%, evenly distributed throughout the vegetation matrix, should be interpreted as Transitional Bayhead Forest (FSBT). The Bayhead Forest classification is typically associated with elongated tree islands within Shark River and Taylor Sloughs.

##### L4 – Transitional Bayhead Forest (FSBT)

Mix of several tree species characterized by Buttonwood (*Conocarpus erectus*), Red Mangrove (*Rhizophora mangle*), Cocoplum (*Chrysobalanus icaco*), Wax Myrtle (*Morella cerifera*), Poisonwood (*Metopium toxiferum*), West Indian Mahogany (*Swietenia mahagoni*), and occasionally Red Bay (*Persea borbonia*), Swamp Bay (*Persea palustris*), Sweetbay (*Magnolia virginiana*), and Dahoon Holly (*Ilex cassine*). The signatures for Buttonwood (*C. erectus*) and Dahoon Holly (*I. cassine*) are often confused in regions where the two species co-exist, leaving Red Mangrove (*R. mangle*) as the distinguishing component between the Transitional Bayhead and Bayhead classes in regions where both classes are likely to be found. The significant presence, of at least 30% cover, of Buttonwood (*C. erectus*) or Red Mangrove (*R. mangle*) evenly distributed

throughout the vegetation matrix sets this class apart from Bayhead Forest (FSB). When Red Mangrove and Buttonwood are confined to the outside fringe (edge) they are not considered indicative of a Transitional Bayhead.

#### **L4 – Cypress Forest (FSt)**

Cypress (*Taxodium* spp.) dominant forest (>50% cover) with common understory vegetation consisting of Pond Apple (*Annona glabra*), Wax Myrtle (*Morella cerifera*), Cocoplum (*Chrysobalanus icaco*), and Leather Fern (*Acrostichum danaeifolium*). In Big Cypress Pop Ash (*Fraxinus caroliniana*) maybe present as well.

#### **L5 – Cypress Forest-Dome (FStD)**

Cypress (*Taxodium* spp.) dominant forest typically found in a pond-like depression.

#### **L5 – Cypress-Hardwood Forest (FStH)**

Co-dominant mix (20% or less difference in percent cover) of Cypress (*Taxodium* spp.) with lowland hardwood trees such as Red Maple (*Acer rubrum*) and Laurel Oak (*Quercus laurifolia*). Common understory vegetation often consists of Pond Apple (*Annona glabra*), Wax Myrtle (*Morella cerifera*), Pop Ash (*Fraxinus caroliniana*), Cocoplum (*Chrysobalanus icaco*), and Leather Fern (*Acrostichum danaeifolium*).

#### **L5 – Cypress Forest-Monotypic (FStM)**

Cypress (*Taxodium* spp.) forest with at least 90% cypress cover (relative).

#### **L5 – Cypress Forest-Strand (FStS)**

Cypress (*Taxodium* spp.) dominant forest typically found in an elongated slough-like or open-ended depression.

### **L2 – Upland Forest (FU)**

Rarely flooded forests consisting of flood intolerant hardwood tree species of both temperate and tropical origins. These communities are found throughout the Everglades along coastal areas and offshore islands, pine woodlands, and interior marshes.

#### **L3 – Hardwood Hammock (FH)**

Rarely flooded hardwood forests associated with flood intolerant trees of both temperate and tropical origins. Species composition is highly diverse and varies throughout the region.

#### **L4 – Coastal Hammock (FHC)**

Coastal hardwood forest containing a species rich assemblage of tropical and temperate broad-leaved trees typified by the presence of Pigeon Plum (*Coccoloba diversifolia*), False Mastic (*Sideroxylon foetidissimum*), Gumbo Limbo (*Bursera simaruba*), Strangler Fig (*Ficus aurea*), White Stopper (*Eugenia axillaris*), Jamaican Dogwood (*Piscidia piscipula*), Buttonwood (*Conocarpus erectus*), Spanish Stopper (*Eugenia foetida*), West Indian Mahogany (*Swietenia mahagoni*), Cabbage Palm (*Sabal Palmetto*), Soapberry (*Sapindus saponaria*), Satinleaf (*Chrysophyllum olivoforme*), Wild Lime (*Zanthoxylum fagara*), Blackbead (*Pithecellobium keyense*), Spanish Bayonet (*Yucca aloifolia*), Catclaw Blackbead (*Pithecellobium unguis-cati*), Triangle Cactus (*Acanthocereus tetragonus*), Prickly Pear (*Opuntia stricta*), Wild Cinnamon (*Canella winterana*), Sea Grape (*Coccoloba uvifera*), Geigertree (*Cordia sebestena*), Milk Bark (*Drypetes lateriflora*),

Seven Year Apple (*Genipa clusiifolia*), Crabwood (*Gymnanthes lucida*), Manchineel (*Hippomane mancinella*), Joewood (*Jacquinia keyensis*), Thach Palm species (*Leucothrinax morrisii* or *Thrinax radiata*), Poisonwood (*Metopium toxiferum*), and Florida bully (*Sideroxylon reclinatum*), among other species.

#### **L5 – West Indian Mahogany Hammock (FHCg)**

Coastal hardwood hammock forest dominated by West Indian Mahogany (*Swietenia mahagoni*) in a matrix of Jamaican Dogwood (*Piscidia piscipula*), Buttonwood (*Conocarpus erectus*), Wild Cinnamon (*Canella winterana*), Spanish Stopper (*Eugenia foetida*), Gumbo Limbo (*Bursera simaruba*), Strangler Fig (*Ficus aurea*), Pigeon Plum (*Coccoloba diversifolia*), and False Mastic (*Sideroxylon foetidissimum*), among others.

#### **L4 – Hardwood Hammock-Pine Forest (FHp)**

Co-dominant mix (20% or less difference in percent cover) of Slash Pine (*Pinus elliottii*) with Laurel Oak (*Quercus laurifolia*), Live Oak (*Quercus virginiana*), and/or Cabbage Palm (*Sabal palmetto*). Common understory vegetation can include mixed hardwood shrubs like Red Mulberry (*Morus rubra*), Sugarberry (*Celtis laevigata*), Common Persimmon (*Diospyros virginiana*), and/or Saw Palmetto (*Serenoa repens*).

#### **L4 – Tropical Hardwood Hammock (FHS)**

Mix species assemblage of False Tamarind (*Lysiloma latisiliquum*), Gumbo Limbo (*Bursera simaruba*), Poisonwood (*Metopium toxiferum*), Pigeon Plum (*Coccoloba diversifolia*), False Mastic (*Sideroxylon foetidissimum*), Live Oak (*Quercus virginiana*), Sugarberry (*Celtis laevigata*), White Stopper (*Eugenia axillaris*) and Lancewood (*Nectandra coriacea*). This class may also contain Strangler Fig (*Ficus aurea*), Swamp Bay (*Persea borbonia*), Dahoon Holly (*Ilex Cassine*), Wax Myrtle (*Morella cerifera*), Myrsine (*Myrsine floridana*), and Willow Busic (*Sideroxylon salicifolium*).

### **L1 – Woodland (W)**

Stands of trees (5 meters or taller) that are of low density (10-49% cover). Trees are evenly spaced out and often in a matrix of sparse shrubs (< 50%), graminoids, and/or herbaceous vegetation.

#### **L2 – Wetland Woodland (WW)**

Regularly flooded low density stands of flood tolerant tree species.

#### **L3 – Swamp Woodland (WS)**

Seasonally to semi-permanently flooded low density stands of freshwater tree species.

#### **L4 – Pine Lowland (WSp)**

Slash Pine (*Pinus elliottii*) in a matrix composed of marsh graminoids, herbs, and/or shrubs. This community is commonly referred to as hydric pine flatwoods.

#### **L5 – Pine Lowland-Graminoid (WSpG)**

Slash Pine (*Pinus elliottii*) in a matrix composed predominately of graminoids, such as Sawgrass (*Cladium jamaicense*), Muhly Grass (*Muhlenbergia capillaris*), Panicgrass (*Panicum* spp.), Little Bluestem (*Schizachyrium rhizomatum*), Flatsedge (*Cyperus* spp.), Fimbristylis (*Fimbristylis* spp.), Beaksedge (*Rhynchospora* spp.), Nutrush (*Scleria* spp.), Yelloweyed Grass (*Xyris* spp.), Bluestem (*Andropogon* spp.), Threeawn (*Aristida* spp.), Witchgrass

(*Dichanthelium* spp.), Lovegrass (*Eragrostis* spp.), Dropseed (*Sporobolus* spp.), and Hairsedge (*Bulbostylis* spp.).

**L5 – Pine Lowland-Shrubs (WSpS)**

Slash Pine (*Pinus elliottii*) in a matrix composed predominately of shrubs, such as Wax Myrtle (*Morella cerifera*), Cabbage Palm (*Sabal palmetto*), Dahoon Holly (*Ilex cassine*), Red Bay (*Persea borbonia*), Buttonbush (*Cephalanthus occidentalis*), and other hardwood swamp species.

**L5 – Pine Lowland-Mixed (WSpX)**

Slash Pine (*Pinus elliottii*) in a matrix composed of a co-dominant mix (20% or less difference in percent cover) of lowland graminoids and shrubs.

**L4 – Cypress Woodland (WSt)**

Cypress (*Taxodium* spp.) in a matrix composed of Open Freshwater Marsh, graminoids, herbs, and/or shrubs.

**L5 – Cypress Woodland-Graminoid Marsh (WStG)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of graminoids, such as Sawgrass (*Cladium jamaicense*), Switchgrass (*Panicum virgatum*), Maidencane (*Panicum hemitomon*), among others.

**L6 – Cypress Woodland-Sawgrass Marsh (WStGc)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Cypress Woodland-Short Sawgrass Marsh (WStGcS)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters tall.

**L8 – Cypress Woodland-Short Sawgrass Marsh-Dense (WStGcSD)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with 50-100% sawgrass cover.

**L7 – Cypress Woodland-Tall Sawgrass Marsh (WStGcT)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than or equal to 2 meters.

**L8 – Cypress Woodland-Tall Sawgrass Marsh-Dense (WStGcTD)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with 50-100% sawgrass cover.

**L6 – Cypress Woodland-Spikerush Marsh (WStGe)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Cypress Woodland-Mixed Graminoid Marsh (WStGX)**

Cypress (*Taxodium* spp.) in a mixed-graminoid understory.

**L5 – Cypress Woodland-Graminoid Prairie (WStGP)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of Freshwater Graminoid Prairie species.

**L5 – Cypress Woodland-Shrubs (WStS)**

Cypress (*Taxodium* spp.) in a matrix composed predominately of shrubs, such as Wax Myrtle (*Morella cerifera*), Pond Apple (*Annona glabra*), and/or Cocoplum (*Chrysobalanus icaco*).

**L5 – Cypress Woodland-Mixed (WStX)**

Cypress (*Taxodium* spp.) in a mixed matrix composed of marsh or prairie graminoids and shrubs.

**L5 – Cypress-Pine Woodland (WStp)**

Co-dominant mix (20% or less difference in percent cover) of Cypress (*Taxodium* spp.) with Slash Pine (*Pinus elliottii*). Common understory vegetation can include mixed hardwood shrubs or various graminoids.

**L6 – Cypress-Pine Woodland-Graminoid (WStpG)**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a matrix composed predominately of freshwater graminoids species such as Sawgrass (*Cladium jamaicense*), Muhly Grass (*Muhlenbergia capillaris*), Panicgrass (*Panicum* spp.), Little Bluestem (*Schizachyrium rhizomatum*), Flatsedge (*Cyperus* spp.), Fimbry (*Fimbristylis* spp.), Beaksedge (*Rhynchospora* spp.), Nutrush (*Scleria* spp.), Yelloweyed Grass (*Xyris* spp.), Bluestem (*Andropogon* spp.), Threeawn (*Aristida* spp.), Witchgrass (*Dichanthelium* spp.), Lovegrass (*Eragrostis* spp.), Dropseed (*Sporobolus* spp.), and Hairsedge (*Bulbostylis* spp.).

**L7 – Cypress-Pine Woodland-Sawgrass Marsh (WStpGc)**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L8 – Cypress-Pine Woodland-Short Sawgrass Marsh (WStpGcS)**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters tall.

**L9 – Cypress-Pine Woodland-Short Sawgrass Marsh-Dense (WStpGcSD):**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with 50-100% sawgrass cover.

**L7 – Cypress-Pine Woodland-Sawgrass Marsh (WStpGX)**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a mixed-graminoid understory.

**L6 – Cypress-Pine Woodland-Mixed (WStpX)**

Bald Cypress (*Taxodium distichum*) and Slash Pine (*Pinus elliottii*) in a mixed matrix composed of marsh or prairie graminoids and shrubs.



**L2 – Upland Woodland (WU)**

Briefly flooded low density stands of trees consisting of semi-flood tolerant or flood intolerant woody species.

**L3 – Upland Hardwood Woodland (WUH)**

Rarely inundated to well drained open canopy stands of tropical and temperate broad-leaved trees and palms.

**L4 – Tropical Hardwood Woodland (WUHS)**

Mix of Live Oak (*Quercus virginiana*), False Tamarind (*Lysiloma latisiliquum*), Gumbo Limbo (*Bursera simaruba*), Poisonwood (*Metopium toxiferum*), Jamaican Dogwood (*Piscidia piscipula*), Pigeon Plum (*Coccoloba diversifolia*), Sea Grape (*Coccoloba uvifera*), and White Stopper (*Eugenia axillaris*). This class may also contain Strangler Fig (*Ficus aurea*), Swamp Bay (*Persea borbonia*), Dahoon Holly (*Ilex Cassine*), Sugarberry (*Celtis laevigata*), Spicewood (*Calyptanthus pallens*), False Mastic (*Sideroxylon foetidissimum*), Mahogany (*Swietenia mahagoni*), Wax Myrtle (*Morella cerifera*), and Myrsine (*Myrsine floridana*), Willow Busic (*Sideroxylon salicifolium*), Red Maple (*Acer rubrum*), Lancewood (*Nectandra coriacea*), and Cabbage Palm (*Sabal palmetto*).

**L3 – Pine Woodland (WUp)**

Stands of Slash Pine (*Pinus elliottii*) trees (10-100% cover) in a matrix composed of upland graminoids, herbs, and/or shrubs. This class is also known as a mesic pine flatwoods. This is an exception to the Woodland class because even in the case of Slash Pine densities from 50-100% cover this community is still considered L1 – Woodland (W).

**L4 – Pine Rockland (WUpR)**

Pine Upland found on low ridges of oolitic limestone.

**L5 – Pine Rockland-Graminoid Marsh (WUpRG)**

Pine Rockland in a matrix composed predominately of graminoids, such as Bluestem (*Andropogon* spp.), Gamagrass (*Tripsacum* spp.), Threeawn (*Aristida* spp.), Lovegrass (*Eragrostis* spp.), Witchgrass (*Dichanthelium* spp.), Panicgrass (*Panicum* spp.), among others.

**L5 – Pine Rockland-Shrubs (WUpRS)**

Pine Rockland in a matrix composed predominately of shrubs and trees, such as Wax Myrtle (*Morella cerifera*), Saw Palmetto (*Serenoa repens*), Cabbage Palm (*Sabal palmetto*), Rough velvetseed (*Guettarda scabra*), Varnishleaf (*Dodonaea viscosa*), St. John's-Wort (*Hypericum* spp.), and other upland hardwood species.

**L6 – Pine Rockland-Saw Palmetto (WUpRSn)**

Pine Rockland in a matrix composed predominately of Saw Palmetto (*Serenoa repens*).

**L5 – Pine Rockland-Mixed (WUpRX)**

Pine Rockland in a matrix composed of a co-dominant mix (20% or less difference in percent cover) of upland graminoids and shrubs.

## L1 – Shrubland (S)

Stands of shrubs (shorter than 5 meters) that are of high density (50-100% cover). Mangrove communities with mean canopy heights of 2 meters or less with canopy cover greater than 10% are an exception to the Shrubland Class and fall under L1 – Scrub class.

### L2 – Wetland Shrubland (SW)

Shrubs adapted to regularly flooded conditions.

#### L3 – Mangrove Shrubland (SM)

Regularly flooded salt tolerant shrubs. These communities are typically found along saltwater shorelines, interior tidal rivers and creeks, or estuarine zones. Mangrove shrubs (taller than 2 meters but shorter than 5 meters) that are of high density (50-100% cover) are considered L1 – Shrubland (S), and if they are of low density (10-49% cover) they are considered L1 – Scrub (C). Dwarf mangrove trees (2 meters or shorter) are an exception to the Shrubland class because regardless of density (10-100% cover) they are L1 – Scrub (C).

#### L4 – Buttonwood Shrubland (SMc)

Buttonwood (*Conocarpus erectus*) dominant Shrubland.

#### L4 – Red Mangrove Shrubland (SMr)

Red Mangrove (*Rhizophora mangle*) dominant Shrubland.

#### L4 – Mixed Mangrove Shrubland (SMX)

Co-dominant mix (20% or less difference in percent cover) between two mangrove tree species with no species having dominance.

#### L5 – Buttonwood-Red Mangrove Shrubland (SMXcr)

Co-dominant mix (20% or less difference in percent cover) of Buttonwood (*Conocarpus erectus*) and Red Mangrove (*Rhizophora mangle*) shrubs.

### L3 – Swamp Shrubland (SS)

Seasonally to semi-permanently flooded freshwater shrubs primarily found in interior wetlands but may extend well into coastal zone.

#### L4 – Pond Apple Shrubland (SSa)

Pond Apple (*Annona glabra*) dominant Shrubland.

#### L4 – Bayhead Shrubland (SSB)

Mix of flood tolerant fresh water shrub species like Swamp Bay (*Persea palustris*), Red Bay (*Persea borbonia*), Cocoplum (*Chrysobalanus icaco*), Dahoon Holly (*Ilex cassine*), Willow (*Salix caroliniana*), Wax Myrtle (*Morella cerifera*), Sweetbay (*Magnolia virginiana*), Pond Apple (*Annona glabra*), and occasionally Buttonwood (*Conocarpus erectus*) or Cypress (*Taxodium* spp.).

#### L4 – Transitional Bayhead Shrubland (SSBT)

Mixed assemblage of shrubs characterized by Buttonwood (*Conocarpus erectus*), Red Mangrove (*Rhizophora mangle*), Cocoplum (*Chrysobalanus icaco*), Wax Myrtle (*Morella cerifera*), Poisonwood (*Metopium toxiferum*), Swamp Bay (*Persea palustris*), Red Bay (*Persea borbonia*),

Sweetbay (*Magnolia virginiana*), Dahoon Holly (*Ilex cassine*), and occasionally West Indian Mahogany (*Swietenia mahagoni*). The signatures for Buttonwood (*C. erectus*) and Dahoon Holly (*I. cassine*) are often confused in regions where the two species co-exist, leaving Red Mangrove (*R. mangle*) as the distinguishing component between the Transitional Bayhead and Bayhead classes in regions where both classes are likely to be found. The significant presence (at least 30% cover) of Buttonwood (*C. erectus*) or Red Mangrove (*R. mangle*) evenly distributed throughout the vegetation matrix sets this class apart from the Bayhead Shrubland class. When these species are confined to the fringe, they are not considered indicative of a Transitional Bayhead.

#### **L4 – Buttonbush Shrubland (SSh)**

Buttonbush (*Cephalanthus occidentalis*) dominant Shrubland.

#### **L4 – Dahoon Holly Shrubland (SSi)**

Dahoon Holly (*Ilex cassine*) dominant Shrubland.

#### **L4 – Wax Myrtle Shrubland (SSm)**

Wax Myrtle (*Morella cerifera*) dominant Shrubland.

#### **L4 – Falsewillow Shrubland (SSr)**

Saltwater Falsewillow (*Baccharis angustifolia*), Silverling (*Baccharis glomeruliflora*), and/or Groundsel Bush (*Baccharis halimifolia*) dominant Shrubland.

#### **L4 – Willow Shrubland (SSs)**

Seasonally to semi-permanently flooded dominant to monotypic stands of Willow (*Salix caroliniana*) shrubs in association with Leather Fern (*Acrostichum danaeifolium*), Cattail (*Typha* spp.), Sawgrass (*Cladium jamaicense*), Arrowhead (*Sagittaria* spp.), as well as other freshwater marsh species. This community is usually characterized by a minimum of 50% Willow (*S. caroliniana*) shrubs. This is an exception to the Forest class because even in the case of Forest height (5 meters or taller) this community is still considered L1 – Shrubland (S).

#### **L4 – Cocoplum Shrubland (SSy)**

Seasonally flooded dominant to monotypic stands of Cocoplum (*Chrysobalanus icaco*) shrubs in association with other wetland species, e.g., Swamp Bay (*Persea palustris*), Red Bay (*Persea borbonia*), Dahoon Holly (*Ilex cassine*), Willow (*Salix caroliniana*), Wax Myrtle (*Morella cerifera*), Sweetbay (*Magnolia virginiana*), Cypress (*Taxodium* spp.), and/or Pond Apple (*Annona glabra*). At higher elevation sites, Cocoplum (*C. icaco*) shrubs may be associated with Poisonwood (*Metopium toxiferum*) and/or Pigeon Plum (*Coccoloba diversifolia*). This community is usually characterized by a minimum of 50% Cocoplum (*C. icaco*) shrubs. This is an exception to the Forest class because even if average vegetation height is 5 meters or taller is still considered L1 – Shrubland (S).

### **L2 – Upland Shrubland (SU)**

Rarely flooded shrub communities consisting of semi-flood tolerant or flood intolerant woody species.

#### **L3 – Tropical Hardwood Shrubland (SUH)**

Mix of Gumbo Limbo (*Bursera simaruba*), Poisonwood (*Metopium toxiferum*), Pigeon Plum (*Coccoloba diversifolia*), White Stopper (*Eugenia axillaris*), Strangler Fig (*Ficus aurea*), Red Bay (*Persea borbonia*),

Dahoon Holly (*Ilex Cassine*), Saffron Plum (*Sideroxylon celastrinum*), Sugarberry (*Celtis laevigata*), False Mastic (*Sideroxylon foetidissimum*), Wax Myrtle (*Morella cerifera*), and Myrsine (*Myrsine floridana*). This class is similar to L4 – Tropical Hardwood Hammock (FHS) except average vegetation height is less than 5 meters.

### **L3 – Saw Palmetto Shrubland (SUn)**

Saw Palmetto (*Serenoa repens*) dominant Shrubland.

## **L1 – Scrub (C)**

Stands of shrubs or dwarf trees (shorter than 5 meters) that are of low density (10-49% cover) and evenly spaced out in a matrix of graminoids and/or herbaceous vegetation. Mangrove communities with mean canopy heights of 2 meters or less with canopy cover greater than 10% are an exception to the Shrubland Class and fall under L1 – Scrub class.

### **L2 – Wetland Scrub (CW)**

Shrubs and dwarf trees adapted to regularly flooded conditions.

### **L3 – Mangrove Scrub (CM)**

Regularly flooded salt tolerant shrubs and dwarf trees. These communities are typically found along saltwater shorelines, interior tidal rivers and creeks, or estuarine zones. Mangrove shrubs (taller than 2 meters but shorter than 5 meters) that are of high density (50-100% cover) are considered L1 – Shrubland (S), and if they are of low density (10-49% cover) they are considered L1 – Scrub (C). Dwarf mangrove trees (2 meters or shorter) are an exception to the Shrubland class because regardless of density (10-100% cover) they are L1 – Scrub (C).

### **L4 – Red Mangrove Scrub (CMr)**

Red Mangrove (*Rhizophora mangle*) dominant scrub.

### **L5 – Red Mangrove Scrub-Dominant (CMrD)**

Red Mangrove (*Rhizophora mangle*) Scrub with an average height up to 2 meters, and mangrove cover of 85% or more.

### **L5 – Red Mangrove Scrub-Graminoid Marsh (CMrG)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of graminoids.

### **L6 – Red Mangrove Scrub-Sawgrass Marsh (CMrGc)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

### **L7 – Red Mangrove Scrub-Short Sawgrass Marsh (CMrGcS)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters tall.

### **L8 – Red Mangrove Scrub-Short Sawgrass Marsh-Dense (CMrGcSD)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with 50-100% sawgrass cover.

**L8 – Red Mangrove Scrub-Short Sawgrass Marsh-Sparse (CMrGcSS)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with less than 50% sawgrass cover.

**L7 – Red Mangrove Scrub-Tall Sawgrass Marsh (CMrGcT)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater 2 meters tall.

**L8 – Red Mangrove Scrub-Tall Sawgrass Marsh-Dense (CMrGcTD)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with 50-100% sawgrass cover.

**L6 – Red Mangrove Scrub-Spikerush Marsh (CMrGe)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Red Mangrove Scrub-Black Rush Marsh (CMrGj)**

Red Mangrove (*Rhizophora mangle*) scrub in a matrix composed predominately of Black Rush (*Juncus roemerianus*).

**L6 – Red Mangrove Scrub-Cattail Marsh (CMrGt)**

Red Mangrove (*Rhizophora mangle*) scrub in a matrix composed predominately of Cattail (*Typha* spp.).

**L6 – Red Mangrove Scrub-Mixed Graminoid Marsh (CMrGX)**

Red Mangrove (*Rhizophora mangle*) scrub in a matrix composed of two or more graminoid marsh species like Spikerush (*Eleocharis* spp.), Panicgrass (*Panicum* spp.), Sawgrass (*Cladium jamaicense*), and/or Beakrush (*Rhynchospora* spp.).

**L5 – Red Mangrove Scrub-Open Marsh (CMrO)**

Red Mangrove (*Rhizophora mangle*) Scrub in a matrix composed predominately of Open Freshwater Marsh or Open Saltwater Marsh, both of which have less than 15% marsh vegetation.

**L4 – Mixed Mangrove Scrub (CMX)**

Co-dominant mix (20% or less difference in percent cover) between two mangrove shrub or dwarf mangrove species with no species having dominance.

**L5 – Buttonwood-Red Mangrove Scrub (CMXcr)**

Co-dominant mix (20% or less difference in percent cover) of Buttonwood (*Conocarpus erectus*) and Red Mangrove (*Rhizophora mangle*) scrub.

**L6 – Buttonwood-Red Mangrove Scrub-Open Marsh (CMXcrO)**

Buttonwood-Red Mangrove Scrub in a matrix composed predominately of Open Freshwater Marsh or Open Saltwater Marsh, both of which have less than 15% marsh vegetation.

**L6 – Buttonwood-Red Mangrove Scrub-Dominant (CMXcrD)**

Buttonwood-Red Mangrove Scrub with an average height up to 2 meters, and mangrove cover of 85% or more.

**L3 – Swamp Scrub (CS)**

Seasonally to semi-permanently flooded freshwater shrubs and dwarf trees primarily found in interior wetlands but may extend well into coastal zones.

**L4 – Pond Apple Scrub (CSa)**

Pond Apple (*Annona glabra*) characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L5 – Pond Apple Scrub-Graminoid Marsh (CSaG)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Pond Apple Scrub-Sawgrass Marsh (CSaGc)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Pond Apple Scrub-Short Sawgrass Marsh (CSaGcS)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) less than 2 meters tall.

**L8 – Pond Apple Scrub-Short Sawgrass Marsh-Dense (CSaGcSD)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Pond Apple Scrub-Tall Sawgrass Marsh (CSaGcT)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) greater than 2 meters tall.

**L8 – Pond Apple Scrub-Tall Sawgrass Marsh-Dense (CSaGcTD)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Pond Apple Scrub-Sawgrass Marsh (CSaGe)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Pond Apple Scrub-Beakrush Marsh (CSaGr)**

Pond Apple (*Annona glabra*) Scrub in a matrix composed predominately of Beakrush (*Rhynchospora* spp.)

**L6 – Pond Apple Scrub-Panicgrass Marsh (CSaGX)**

Pond Apple (*Annona glabra*) Scrub in a mixed-graminoid matrix with no graminoid species in dominance.



**L4 – Bayhead Swamp Scrub (CSB)**

Mixed assemblage of shrubs such as Red Bay (*Persea borbonia*), Sweet Bay (*Magnolia virginiana*), Pond Apple (*Annona glabra*), Willow (*Salix caroliniana*), Wax Myrtle (*Morella cerifera*), Dahoon Holly (*Ilex cassine*), and/or Cocoplum (*Chrysobalanus icaco*) in a matrix of long-hydroperiod grasses, herbs, and, at times, including various species of vines. Canopy density will range from 10-49%. This community is typical of tree island tails or drainage areas with peat soils.

**L5 – Bayhead Swamp Scrub-Graminoid Marsh (CSBG)**

Bayhead Swamp Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Bayhead Swamp Scrub-Sawgrass Marsh (CSBGc)**

Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Bayhead Swamp Scrub-Short Sawgrass Marsh (CSBGcS)**

Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters.

**L8 – Bayhead Swamp Scrub-Short Sawgrass Marsh-Sparse (CSBGcSS)**

Bayhead Swamp Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover less than 50%.

**L8 – Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense (CSBGcSD)**

Bayhead Swamp Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Bayhead Swamp Scrub-Tall Sawgrass Marsh (CStGcT)**

Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than or equal to 2 meters.

**L8 – Bayhead Swamp Scrub-Tall Sawgrass Marsh-Sparse (CSBGcTS)**

Bayhead Swamp Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover less than 50%.

**L8 – Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense (CSBGcTD)**

Bayhead Swamp Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Bayhead Swamp Scrub-Spikerush Marsh (CSBGc)**

Bayhead Swamp Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Bayhead Swamp Scrub-Cattail Marsh (CSBGt)**

Bayhead Swamp scrub in a matrix composed predominately of Cattail (*Typha* spp.).

**L5 – Bayhead Swamp Scrub-Herbaceous Marsh (CSBGX)**

Bayhead Swamp Scrub in a mixed-graminoid matrix with no graminoid species in dominance.

**L4 – Transitional Bayhead Swamp Scrub (CSBT)**

Mixed assemblage of shrubs characterized by Buttonwood (*Conocarpus erectus*), Red Mangrove (*Rhizophora mangle*), Cocoplum (*Chrysobalanus icaco*), Wax Myrtle (*Morella cerifera*), Poisonwood (*Metopium toxiferum*), and occasionally West Indian Mahogany (*Swietenia mahagoni*), Swamp Bay (*Persea palustris*), Red Bay (*Persea borbonia*), Sweetbay (*Magnolia virginiana*), and Dahoon Holly (*Ilex cassine*). The signatures for Buttonwood (*C. erectus*) and Dahoon Holly (*I. cassine*) are often confused in regions where the two species co-exist, leaving Red Mangrove (*R. mangle*) as the distinguishing component between the Transitional Bayhead and Bayhead classes in regions where both classes are likely to be found. The significant presence (at least 30% cover) of Buttonwood (*C. erectus*) or Red Mangrove (*R. mangle*) evenly distributed throughout the vegetation matrix sets this class apart from the Bayhead Scrub class. Note that when these species are confined to the outside fringe, they are not considered indicative of a Transitional Bayhead. Shrub cover will range from 10-49%.

**L5 – Transitional Bayhead Swamp Scrub-Graminoid Marsh (CSBTG)**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Transitional Bayhead Swamp Scrub-Sawgrass Marsh (CSBTGc)**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Transitional Bayhead Swamp Scrub -Short Sawgrass Marsh (CSBTGcS):**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters.

**L8 – Transitional Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense (CSBGtcSD)**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Transitional Bayhead Swamp Scrub -Tall Sawgrass Marsh (CSBGcT)**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than or equal to 2 meters.

**L8 – Transitional Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense (CSBGcTD):**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Transitional Bayhead Swamp Scrub-Spikerush Marsh (CSBTGe)**

Transitional Bayhead Swamp Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L4 – Buttonbush Scrub (CSh)**

Buttonbush (*Cephalanthus occidentalis*) shrubs with 10-49% cover.

**L5 – Buttonbush Scrub-Graminoid Marsh (CShG)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Buttonbush Scrub-Sawgrass Marsh (CShGc)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Buttonbush Scrub-Short Sawgrass Marsh (CShGcS)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) less than 2 meters tall.

**L8 – Buttonbush Scrub-Short Sawgrass Marsh-Dense (CShGcSD)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Buttonbush Scrub-Tall Sawgrass Marsh (CShGcT)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) greater than 2 meters tall.

**L8 – Buttonbush Scrub-Tall Sawgrass Marsh-Dense (CShGcTD)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Buttonbush Scrub-Mixed Graminoid Marsh (CShGX)**

Buttonbush (*Cephalanthus occidentalis*) Scrub in a matrix composed of two or more graminoid marsh species like Spikerush (*Eleocharis* spp.), Panicgrass (*Panicum* spp.), Sawgrass (*Cladium jamaicense*), and/or Beakrush (*Rhynchospora* spp.).

**L4 – Dahoon Holly Scrub (CSi)**

Dahoon Holly (*Ilex cassine*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L5 – Dahoon Holy Scrub-Graminoid Marsh (CSiG)**

Dahoon Holly (*Ilex cassine*) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Dahoon Holly Scrub-Mixed Graminoid Marsh (CSiGX)**

Dahoon Holly (*Ilex cassine*) Scrub in a mixed-graminoid matrix with no graminoid species in dominance.

**L4 – Wax Myrtle Scrub (CSm)**

Wax Myrtle (*Morella cerifera*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L5 – Wax Myrtle Scrub-Mixed Graminoid Marsh (CSmH)**

Wax Myrtle (*Morella cerifera*) Scrub in a matrix composed predominately of herbaceous vegetation.

**L5 – Wax Myrtle Scrub-Graminoid Prairie (CSmGP)**

Wax Myrtle (*Morella cerifera*) Scrub in a matrix composed predominately of Freshwater Graminoid Prairie species.

**L4 – Falsewillow Scrub (CSr)**

Saltwater Falsewillow (*Baccharis angustifolia*), Silverling (*Baccharis glomeruliflora*), and/or Groundsel Bush (*Baccharis halimifolia*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L5 – Falsewillow Scrub-Graminoid Marsh (CSrG)**

Falsewillow (*Baccharis* spp.) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Falsewillow Scrub-Mixed Graminoid Marsh (CSrGX)**

Falsewillow (*Baccharis* spp.) Scrub in a mixed-graminoid matrix with no graminoid species in dominance.

**L5 – Falsewillow Scrub-Herbaceous Marsh (CSrH)**

Falsewillow (*Baccharis* spp.) Scrub in a matrix composed predominately of herbaceous vegetation.

**L4 – Willow Scrub (CSs)**

Willow (*Salix caroliniana*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L5 – Willow Scrub-Graminoid Marsh (CSsG)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Willow Scrub-Sawgrass Marsh (CSsGc)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Willow Scrub-Short Sawgrass Marsh (CSsGcS)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) less than 2 meters tall.

**L8 – Willow Scrub-Short Sawgrass Marsh-Sparse (CSsGcSS)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover less than 50%.

**L8 – Willow Scrub-Short Sawgrass Marsh-Dense (CSsGcSD)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Willow Scrub-Tall Sawgrass Marsh (CSsGcT)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than or equal to 2 meters.

**L8 – Willow Scrub-Short Sawgrass Marsh-Sparse (CSsGcTS)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass less than 50%.

**L8 – Willow Scrub-Tall Sawgrass Marsh-Dense (CSsGcTD)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Willow Scrub-Spikerush Marsh (CSsGe)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Willow Scrub-Common Reed Marsh (CSsGg)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of Common Reed (*Phragmites* spp.).

**L6 – Willow Scrub-Cattail Marsh (CSsGt)**

Willow (*Salix caroliniana*) scrub in a matrix composed predominately of Cattail (*Typha* spp.).

**L6 – Willow Scrub-Mixed Graminoid Marsh (CSsGX)**

Willow (*Salix caroliniana*) Scrub in a mixed-graminoid matrix with no graminoid species in dominance.

**L5 – Willow Scrub-Graminoid Prairie (CSsGP)**

Willow (*Salix caroliniana*) in a matrix composed predominately of Freshwater Graminoid Prairie species.

**L5 – Willow Scrub-Emergent Marsh (CSsE)**

Willow (*Salix caroliniana*) Scrub in a matrix composed predominately of broadleaf emergent vegetation.

**L5 – Willow Scrub-Herbaceous Marsh (CSsH)**

Willow (*Salix caroliniana*) in a matrix composed predominately of herbaceous vegetation.

**L4 – Cypress Scrub (CSt)**

Cypress (*Taxodium* spp.) dwarf trees with 10-100% cover. This is an exception to the Shrubland class because even in the case of Shrubland density (50-100% cover) this community is still considered L1 – Scrub (C).

**L5 – Cypress Scrub-Graminoid Marsh (CStG)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L6 – Cypress Scrub-Sawgrass Marsh (CStGc)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L7 – Cypress Scrub-Short Sawgrass Marsh (CStGcS)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters.

**L8 – Cypress Scrub-Short Sawgrass Marsh-Dense (CStGcSS)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 10-49%.

**L8 – Cypress Scrub-Short Sawgrass Marsh-Dense (CStGcSD)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L7 – Cypress Scrub-Tall Sawgrass Marsh (CStGcT)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than or equal to 2 meters.

**L8 – Cypress Scrub-Short Sawgrass Marsh-Dense (CStGcTD)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Cypress Scrub-Spikerush Marsh (CStGe)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Spikerush (*Eleocharis* spp.).

**L6 – Cypress Scrub-Beakrush Marsh (CStGr)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Beakrush (*Rhynchospora* spp.).

**L6 – Cypress Scrub-Cattail Marsh (CStGt)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Cattails (*Typha* spp.).

**L6 – Cypress Scrub-Mixed Graminoid Marsh (CStGX)**

Cypress (*Taxodium* spp.) Scrub in a mixed-graminoid matrix with no graminoid species in dominance.

**L5 – Cypress Scrub-Graminoid Prairie (CStGP)**

Cypress (*Taxodium* spp.) Scrub in a matrix composed predominately of Freshwater Graminoid Prairie species.

**L5 – Cypress-Hardwood Scrub (CStW)**

Cypress (*Taxodium* spp.) Scrub with at least 10% cover of other hardwood trees and/or shrubs such as Wax Myrtle (*Morella cerifera*), Cabbage palm (*Sabal palmetto*), Red Maple (*Acer rubrum*), Myrsine (*Myrsine floridana*), Dahoon Holly (*Ilex Cassine*), Cocoplum (*Chrysobalanus icaco*), Swamp Bay (*Persea palustris*) and/or Pond Apple (*Annona glabra*).

**L6 – Cypress-Hardwood Scrub-Graminoid Marsh (CStWG)**

Cypress-Hardwood Scrub in a matrix composed predominately of Freshwater Graminoid Marsh.

**L7 – Cypress-Hardwood Scrub-Sawgrass Marsh (CStWGc)**

Cypress-Hardwood Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*).

**L8 – Cypress-Hardwood Scrub-Short Sawgrass Marsh (CStWGcS)**

Cypress-Hardwood Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height less than 2 meters.

**L9 – Cypress-Hardwood Scrub-Short Sawgrass Marsh-Dense (CStWGcSD)**

Cypress-Hardwood Scrub in a matrix composed predominately of Short Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L8 – Cypress-Hardwood Scrub-Short Sawgrass Marsh (CStWGcT)**

Cypress-Hardwood Scrub in a matrix composed predominately of Sawgrass (*Cladium jamaicense*) with average height greater than 2 meters.

**L9 – Cypress-Hardwood Scrub-Short Sawgrass Marsh-Dense (CStWGcTD)**

Cypress-Hardwood Scrub in a matrix composed predominately of Tall Sawgrass (*Cladium jamaicense*) with sawgrass cover between 50-100%.

**L6 – Cypress-Hardwood Scrub-Graminoid Prairie (CStWGP)**

Cypress-Hardwood scrub mix in a matrix composed predominately of Freshwater Graminoid Prairie species.

**L2 – Upland Scrub (CU)**

Rarely flooded low density (10-49%) shrub communities consisting of semi-flood tolerant or flood intolerant woody species found on marl or rocky substrate.

**L3 – Upland Hardwood Scrub (CUW)**

Mix of shrubs such as Poisonwood (*Metopium toxiferum*), Red Bay (*Persea borbonia*), Myrsine (*Myrsine floridana*), Wax Myrtle (*Morella cerifera*), Dahoon Holly (*Ilex cassine*), Cocoplum (*Chrysobalanus icaco*), Falsewillow (*Baccharis* spp.), Buttonwood (*Conocarpus erectus*), Cabbage Palm (*Sabal palmetto*), West Indian Mahogany (*Swietenia mahagoni*), an/or Saffron Plum (*Sideroxylon celastrinum*) in a matrix of prairie grasses, herbs, and, at times, including various species of vines. Canopy density will range from 10-49%. This community is typically found in marl prairie environments or along the edge of pine rocklands on marl soils or rocky substrates.

**L4 – Upland Hardwood Scrub-Graminoid Prairie (CUWGP)**

Upland Hardwood Scrub in a matrix of short-hydroperiod graminoids species such as Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), Sawgrass (*Cladium jamaicense*), Little Bluestem (*Schizachyrium* spp.), among others.

**L3 – Saw Palmetto Scrub (CUn)**

Saw Palmetto (*Serenoa repens*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L4 – Saw Palmetto Scrub-Graminoid Prairie (CUNGP)**

Saw Palmetto (*Serenoa repens*) Scrub in a matrix of short-hydroperiod graminoids species such as Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), Sawgrass (*Cladium jamaicense*), Little Bluestem (*Schizachyrium* spp.), among others.

**L3 – Cabbage Palm Upland Scrub (CUo)**

Cabbage Palm (*Sabal palmetto*) shrubs characterized by canopy densities from 10-49% in a matrix of graminoids and/or herbaceous vegetation.

**L4 – Cabbage Palm Upland Scrub-Graminoid Prairie (CUoGP)**

Cabbage Palm (*Sabal palmetto*) Scrub in a matrix of short-hydroperiod graminoids species such as Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), Sawgrass (*Cladium jamaicense*), Little Bluestem (*Schizachyrium* spp.), among others.

**L1 – Marsh (M)**

Graminoid, herbaceous, emergent, and/or floating vegetation in shallow water that stands at or above the ground surface for much of the year. Prairie habitat is included in this class. A marsh can have low density (0-9%) tree and shrub cover.

**L2 – Salt Marsh (MS)**

A wetland consisting of salt tolerant graminoid and/or herbaceous vegetation.

**L3 – Graminoid Salt Marsh (MSG)**

Salt tolerant graminoid dominated marsh, including species such as Saltgrass (*Distichlis spicata*), Black Rush (*Juncus roemerianus*), Keysgrass (*Monanthochloe littoralis*), Gulf Cordgrass (*Spartina spartinae*), Marshhay Cordgrass (*Spartina patens*), and/or Dropseed (*Sporobolus* spp.).

**L4 – Black Rush Marsh (MSGj)**

Black Rush (*Juncus roemerianus*) dominate Graminoid Salt Marsh.

**L2 – Freshwater Marsh (MF)**

A wetland consisting of freshwater graminoid and/or herbaceous vegetation.

**L3 – Broadleaf Emergent Marsh (MFB)**

Golden Leather Fern (*Acrostichum aureum*), Leather Fern (*Acrostichum danaeifolium*), Pickerelweed (*Pontederia cordata*), Lanceleaf Arrowhead (*Sagittaria lancifolia*), and/or Alligator Flag (*Thalia geniculata*) broadleaf emergent dominate marsh.



**L3 – Graminoid Freshwater Marsh (MFG)**

Long hydroperiod marsh consisting of Sawgrass (*Cladium jamaicense*), Spikerush (*Eleocharis* spp.), Soft Rush (*Juncus effusus*), Maidencane (*Panicum hemitomon*), Common Reed (*Phragmites australis*), Cattail (*Typha* spp.) and/or Sand Cordgrass (*Spartina bakeri*), among others.

**L4 – Panicgrass Marsh (MFGa)**

Maidencane (*Panicum hemitomon*) and/or Redtop Panicum (*Panicum rigidulum*) dominate marsh.

**L4 – Sawgrass Marsh (MFGc)**

Sawgrass (*Cladium jamaicense*) dominate marsh.

**L5 – Short Sawgrass Marsh (MFGcS)**

Sawgrass (*Cladium jamaicense*) Marsh with average height shorter than 2 meters.

**L6 – Short Sawgrass Marsh-Dense (MFGcSD)**

Short Sawgrass (*Cladium jamaicense*) Marsh with 50-100% sawgrass cover.

**L6 – Short Sawgrass Marsh-Sparse (MFGcSS)**

Short Sawgrass (*Cladium jamaicense*) Marsh with 15-49% sawgrass cover.

**L5 – Tall Sawgrass Marsh (MFGcT)**

Sawgrass (*Cladium jamaicense*) Marsh with average height of 2 meters or taller.

**L6 – Tall Sawgrass Marsh-Dense (MFGcTD)**

Tall Sawgrass (*Cladium jamaicense*) Marsh with 50-100% sawgrass cover.

**L6 – Tall Sawgrass Marsh-Sparse (MFGcTS)**

Tall Sawgrass (*Cladium jamaicense*) Marsh with 15-49% sawgrass cover.

**L4 – Spikerush Marsh (MFGe)**

Coastal Spikerush (*Eleocharis cellulosa*), Slim Spikerush (*Eleocharis elongata*), and/or Knotted Spikerush (*Eleocharis interstincta*) dominate marsh.

**L4 – Common Reed Marsh (MFGg)**

Common Reed (*Phragmites australis*) dominate marsh.

**L4 – Beakrush Marsh (MFGr)**

Beakrush (*Rhynchospora* spp.) dominate marsh. Beakrush found in the substantial presence of low-stature Sawgrass (*Cladium jamaicense*) is characterized by L5 – Sawgrass-Rhynchospora Marsh. Beakrush found in the substantial presence of Little Bluestem (*Schizachyrium rhizomatum*) and/or Muhly Grass (*Muhlenbergia capillaris* var. *filipes*) is characteristic of a L3 – Graminoid Freshwater Prairie (MFGP).

**L4 – Cattail Marsh (MFGt)**

Cattail (*Typha* spp.) dominate marsh.

**L5 – Cattail Marsh Sparse (MFGtS)**

10-49% cover of Cattail (*Typha* spp.).

**L5 – Cattail Marsh Dominant (MFGtD)**

50-89% cover of Cattail (*Typha* spp.).

**L5 – Cattail Marsh Monotypic (MFGtM)**

Greater than or equal to 90% cover of Cattail (*Typha* spp.).

**L4 – Mixed Graminoid Freshwater Marsh (MFGX)**

A co-dominant mix of two or more graminoid marsh species like Spikerush (*Eleocharis* spp.), Panicgrass (*Panicum* spp.), Sawgrass (*Cladium jamaicense*), and/or Beakrush (*Rhynchospora* spp.). This community is characterized by having no graminoid species in dominance, meaning there is 15% or less difference in percent cover between two or more graminoid species.

**L5 – Sawgrass- Black Rush Marsh (MFGXcj)**

A co-dominant mix (15% or less difference in percent cover) of Sawgrass (*Cladium jamaicense*) and Black Rush (*Juncus roemerianus*).

**L5 – Sawgrass-Rhynchospora Marsh (MFGXcr)**

A co-dominant mix (15% or less difference in percent cover) of Sawgrass (*Cladium jamaicense*) and Beakrush (*Rhynchospora tracyi*).

**L3 – Graminoid Freshwater Prairie (MFGP)**

Short hydroperiod marsh characterized by a mix of graminoids that includes low-stature Sawgrass (*Cladium jamaicense*), Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), Little Bluestem (*Schizachyrium rhizomatum*), and Black Sedge (*Schoenus nigricans*), among others.

**L4 – Black Sedge Prairie (MFGPh)**

Black Sedge (*Schoenus nigricans*) dominate wet prairie.

**L3 – Floating Emergent Marsh (MFF)**

Long hydroperiod marsh consisting of floating emergent vegetation such as Spatterdock (*Nuphar lutea* subsp. *advena*) and Waterlily (*Nymphaea odorata*).

**L4 – Spatterdock Marsh (MFFn)**

Spatterdock (*Nuphar lutea* subsp. *advena*) dominate marsh.

**L4 – Waterlily Marsh (MFFy)**

Waterlily (*Nymphaea odorata*) dominate marsh.

**L3 – Herbaceous Freshwater Marsh (MFH)**

Herbaceous dominated marsh consisting of Morning Glory (*Ipomoea* spp.), Hempvine (*Mikania* spp.), and/or Smartweed (*Polygonum* spp.) among others.

**L3 – Open Freshwater Marsh (MFO)**

Open water with less than 15% vegetation cover consisting of a mix of sparse graminoids, herbaceous, and/or emergent freshwater vegetation, such as Spikerush (*Eleocharis* spp.), Panicgrass (*Panicum*

spp.), Sawgrass (*Cladium jamaicense*), Cattail (*Typha* spp.), Arrowhead (*Sagittaria* spp.), Pickerelweed (*Pontederia cordata*), Waterlily (*Nymphaea* spp.), Green Arum (*Peltandra virginica*), Swamp-Lily (*Crinum americanum*), Spider-lilies (*Hymenocallis* spp.), among others.

### **L3 – Mixed Graminoid-Broadleaf Freshwater Marsh (MFXGB)**

A co-dominant mix (20% or less difference in percent cover) of two or more long hydroperiod freshwater graminoid such as sawgrass (*Cladium jamaicense*), cattail (*Typha* spp.), and/or spikerush (*Eleocharis* spp.) in association with broadleaf species such as Alligator Flag (*Thalia geniculata*), Arrowhead (*Sagittaria* spp.), and/or Pickerelweed (*Pontederia cordata*), for example.

## **L1 – Exotic (E)**

Invasive non-native species assemblages.

### **L2 – Australian Pine (Ec)**

River Sheoak (*Casuarina cunninghamiana*), Australian Pine (*Casuarina equisetifolia*), and Suckering Australian Pine (*Casuarina glauca*).

#### **L3 – Australian Pine Sparse (EcS)**

10-49% cover of Australian Pine (*Casuarina* spp.).

#### **L3 – Australian Pine Dominant (EcD)**

50-89% cover of Australian Pine (*Casuarina* spp.).

#### **L3 – Australian Pine Monotypic (EcM)**

Greater than or equal to 90% cover of Australian Pine (*Casuarina* spp.).

### **L2 – Giant Grasses (EG)**

Napier Grass (*Pennisetum purpureum*) and Silkreed (*Neyraudia reynaudiana*).

#### **L3 – Giant Grasses Sparse (EGS)**

10-49% cover of Giant Grasses.

#### **L3 – Giant Grasses Dominant (EGD)**

50-89% cover of Giant Grasses.

#### **L3 – Giant Grasses Monotypic (EGM)**

Greater than or equal to 90% cover of Giant Grasses.

### **L2 – Melaleuca (Em)**

Punk tree (*Melaleuca quinquenervia*).

#### **L3 – Melaleuca Sparse (EaS)**

10-49% cover of Melaleuca (*Melaleuca quinquenervia*).

#### **L3 – Melaleuca Dominant (EaD)**

50-89% cover of Melaleuca (*Melaleuca quinquenervia*).

**L3 – Melaleuca Monotypic (EaM)**

Greater than or equal to 90% cover of Melaleuca (*Melaleuca quinquenervia*).

**L2 – Brazilian Pepper (Es)**

Brazilian Pepper (*Schinus terebinthifolius*).

**L3 – Brazilian Pepper Sparse (EsS)**

10-49% cover of Brazilian Pepper (*Schinus terebinthifolius*).

**L3 – Brazilian Pepper Dominant (EsD)**

50-89% cover of Brazilian Pepper (*Schinus terebinthifolius*).

**L3 – Brazilian Pepper Monotypic (EsM)**

Greater than or equal to 90% cover of Brazilian Pepper (*Schinus terebinthifolius*).

**L1 – Other (O)**

Anthropogenic or non-vegetative features landscape features.

**L2 – Non-Vegetative (ON)**

Natural areas devoid of vegetation.

**L3 – Water (ONW)**

Open water such as ponds, lakes, rivers, bays, and estuaries.

**L2 – Anthropogenic (OA)**

Non-natural cover associated with human infrastructure and/or activities these.

**L3 – Agriculture (OAA)**

An area of cleared land manipulated for the purpose of growing crops.

**L3 – Canal (OAC)**

An artificial waterway constructed to allow the passage of boats or ships inland, or to convey water.

**L3 – Levee (OAL)**

An embankment built to prevent the overflow of water from a river, canal, or lake.

**L3 – Spoil (OAS)**

Waste material brought up during an excavation or a dredging.

**L3 – Trail (OAT)**

A defined path that has been established through a landscape for the purpose of travel from one point to another.

**L4 – Road (OATr)**

A hard-flat open passageway built for the movement of vehicles, people, and animals between two or more points.

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## Appendix C. Area, Percentage, and Frequency of all Thematic Classes Mapped in the Shark River Slough/Long Pine Key, Region 1, Vegetation Map of Everglades National Park

**Table C-1. Thematic class area, percentage, and frequency [ha—hectare; ac—acre].**

Thematic Class	Thematic Class Code	Area (ha)	Area (Ac)	Percent Area	Number of Mapped Cells
Agriculture	OAA	59	146	0.04%	236
Anthropogenic	OA	465	1,148	0.29%	1,859
Australian Pine	Ec	23	57	0.01%	93
Bayhead Forest	FSB	862	2,130	0.53%	3,448
Bayhead Shrubland	SSB	1,713	4,234	1.06%	6,853
Bayhead Swamp Scrub-Cattail Marsh	CSBGt	11	27	0.01%	44
Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense	CSBGcSD	374	923	0.23%	1,494
Bayhead Swamp Scrub-Short Sawgrass Marsh-Sparse	CSBGcSS	10	25	0.01%	41
Bayhead Swamp Scrub-Spikerush Marsh	CSBGe	1	1	<0.01%	2
Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense	CSBGcTD	1,053	2,601	0.65%	4,211
Bayhead Swamp Scrub-Tall Sawgrass Marsh-Sparse	CSBGcTS	7	17	<0.01%	28
Bayhead Swamp Scrub-Mixed Graminoid Marsh	CSBGX	30	74	0.02%	120
Beakrush Marsh	MFGGr	426	1,051	0.26%	1,702
Black Rush Marsh	MSGj	0	1	<0.01%	1
Black Sedge Prairie	MFGPh	249	615	0.15%	995
Brazilian Pepper	Es	1,047	2,586	0.65%	4,186
Broadleaf Emergent Marsh	MFB	6	14	<0.01%	23
Buttonbush Scrub-Mixed Graminoid Marsh	CShGX	1	3	<0.01%	5

Thematic Class	Thematic Class Code	Area (ha)	Area (Ac)	Percent Area	Number of Mapped Cells
Buttonbush Scrub-Short Sawgrass Marsh-Dense	CShGcSD	17	43	0.01%	69
Buttonbush Scrub-Tall Sawgrass Marsh-Dense	CShGcTD	52	129	0.03%	209
Buttonbush Shrubland	SSh	4	9	<0.01%	15
Buttonwood Forest	FMc	1	2	<0.01%	3
Buttonwood Shrubland	SMc	0	1	<0.01%	1
Buttonwood-Red Mangrove Scrub-Dominant	CMXcrD	14	33	0.01%	54
Buttonwood-Red Mangrove Scrub-Open Marsh	CMXcrO	24	58	0.01%	94
Buttonwood-Red Mangrove Shrubland	SMXcr	6	15	<0.01%	24
Cabbage Palm Upland Scrub-Graminoid Prairie	CUoGP	13	32	0.01%	52
Canal	OAC	44	109	0.03%	176
Cattail Marsh	MFGt	222	549	0.14%	888
Cocoplum Shrubland	SSy	16	40	0.01%	64
Common Reed Marsh	MFGg	1	2	<0.01%	4
Cypress Forest-Dome	FStD	83	205	0.05%	332
Cypress Forest-Monotypic	FStM	335	827	0.21%	1,339
Cypress Forest-Strand	FStS	6	14	<0.01%	22
Cypress Scrub-Beakrush Marsh	CStGr	1	3	<0.01%	5
Cypress Scrub-Cattail Marsh	CStGt	1	1	<0.01%	2
Cypress Scrub-Graminoid Prairie	CStGP	2,318	5,728	1.43%	9,272
Cypress Scrub-Mixed Graminoid Marsh	CStGX	617	1,523	0.38%	2,466
Cypress Scrub-Short Sawgrass Marsh-Dense	CStGcSD	1,097	2,710	0.68%	4,387
Cypress Scrub-Short Sawgrass Marsh-Sparse	CStGcSS	73	181	0.05%	293
Cypress Scrub-Spikerush Marsh	CStGe	6	15	<0.01%	24

<b>Thematic Class</b>	<b>Thematic Class Code</b>	<b>Area (ha)</b>	<b>Area (Ac)</b>	<b>Percent Area</b>	<b>Number of Mapped Cells</b>
Cypress Scrub-Tall Sawgrass Marsh-Dense	CStGcTD	54	133	0.03%	215
Cypress Woodland-Graminoid Prairie	WStGP	269	664	0.17%	1,075
Cypress Woodland-Mixed	WStX	44	108	0.03%	175
Cypress Woodland-Mixed Graminoid Marsh	WStGX	42	103	0.03%	166
Cypress Woodland-Short Sawgrass Marsh-Dense	WStGcSD	53	131	0.03%	212
Cypress Woodland-Shrubs	WStS	50	124	0.03%	200
Cypress Woodland-Spikerush Marsh	WStGe	0	1	<0.01%	1
Cypress Woodland-Tall Sawgrass Marsh-Dense	WStGcTD	11	28	0.01%	45
Cypress-Hardwood Forest	FStH	2	4	<0.01%	7
Cypress-Hardwood Scrub-Graminoid Prairie	CStWGP	12	30	0.01%	49
Cypress-Hardwood Scrub-Short Sawgrass Marsh-Dense	CStWGcSD	4	9	<0.01%	14
Cypress-Hardwood Scrub-Tall Sawgrass Marsh-Dense	CStWGcTD	1	2	<0.01%	3
Cypress-Pine Woodland-Mixed	WStpX	1	1	<0.01%	2
Cypress-Pine Woodland-Mixed Graminoid Marsh	WStpGX	2	5	<0.01%	8
Cypress-Pine Woodland-Short Sawgrass Marsh-Dense	WStpGcSD	1	1	<0.01%	2
Dahoon Holly Scrub-Mixed Graminoid Marsh	CSiGX	44	109	0.03%	177
Dahoon Holly Shrubland	SSi	16	38	0.01%	62
Falsewillow Scrub-Herbaceous Marsh	CSrH	6	14	<0.01%	22
Falsewillow Scrub-Mixed Graminoid Marsh	CSrGX	1	2	<0.01%	3
Falsewillow Shrubland	SSr	1	2	<0.01%	3
Giant Grasses	EG	68	169	0.04%	273



Thematic Class	Thematic Class Code	Area (ha)	Area (Ac)	Percent Area	Number of Mapped Cells
Graminoid Freshwater Prairie	MFGP	45,650	112803	28.14%	182,599
Hardwood Hammock-Pine Forest	FHp	1	2	<0.01%	4
Herbaceous Freshwater Marsh	MFH	2	6	<0.01%	9
Levee	OAL	94	231	0.06%	374
Melaleuca	Em	65	160	0.04%	259
Mixed Graminoid Freshwater Marsh	MFGX	12,162	30,053	7.50%	48,648
Mixed Graminoid-Broadleaf Freshwater Marsh	MFXGB	3	8	<0.01%	13
Open Freshwater Marsh	MFO	154	381	0.10%	617
Panicgrass Marsh	MFGa	1	3	<0.01%	5
Pine Lowland-Graminoid	WSpG	1	1	<0.01%	2
Pine Lowland-Mixed	WSpX	1	3	<0.01%	5
Pine Lowland-Shrubs	WSpS	2	5	<0.01%	8
Pine Rockland-Graminoids	WUpRG	591	1,460	0.36%	2,364
Pine Rockland-Mixed	WUpRX	1,690	4,177	1.04%	6,761
Pine Rockland-Shrubs	WUpRS	3,428	8,471	2.11%	13,712
Pine Rockland-Saw Palmetto	WUpRSn	42	104	0.03%	168
Pond Apple Forest	FSa	13	31	0.01%	50
Pond Apple Scrub-Beakrush Marsh	CSaGr	10	25	0.01%	41
Pond Apple Scrub-Mixed Graminoid Marsh	CSaGX	6	14	<0.01%	23
Pond Apple Scrub-Short Sawgrass Marsh-Dense	CSaGcSD	11	26	0.01%	42
Pond Apple Scrub-Spikerush Marsh	CSaGe	0	1	<0.01%	1
Pond Apple Scrub-Tall Sawgrass Marsh-Dense	CSaGcTD	6	15	<0.01%	24
Pond Apple Shrubland	SSa	18	44	0.01%	72

Thematic Class	Thematic Class Code	Area (ha)	Area (Ac)	Percent Area	Number of Mapped Cells
Red Mangrove Forest	FMr	2	4	<0.01%	6
Red Mangrove Scrub-Black Rush Marsh	CMrGj	0	1	<0.01%	1
Red Mangrove Scrub-Cattail Marsh	CMrGt	1	2	<0.01%	3
Red Mangrove Scrub-Dominant	CMrD	374	924	0.23%	1,495
Red Mangrove Scrub-Mixed Graminoid Marsh	CMrGX	2	4	<0.01%	7
Red Mangrove Scrub-Open Marsh	CMrO	760	1,877	0.47%	3,038
Red Mangrove Scrub-Short Sawgrass Marsh-Dense	CMrGcSD	330	816	0.20%	1,321
Red Mangrove Scrub-Short Sawgrass Marsh-Sparse	CMrGcSS	59	145	0.04%	234
Red Mangrove Scrub-Spikerush Marsh	CMrGe	175	432	0.11%	699
Red Mangrove Scrub-Tall Sawgrass Marsh-Dense	CMrGcTD	4	10	<0.01%	16
Red Mangrove Shrubland	SMr	10	23	0.01%	38
Road	OATr	16	40	0.01%	64
Saw Palmetto Scrub-Graminoid Prairie	CUnGP	38	94	0.02%	152
Saw Palmetto Shrubland	SUn	3	8	<0.01%	13
Sawgrass-Black Rush Marsh	MFGXcj	1	2	<0.01%	3
Sawgrass-Beakrush Marsh	MFGXcr	4472	11,049	2.76%	17,886
Short Sawgrass Marsh-Dense	MFGcSD	54,551	134,798	33.63%	218,203
Short Sawgrass Marsh-Sparse	MFGcSS	711	1,757	0.44%	2,844
Spattdock	MFFn	10	25	0.01%	41
Spikerush Marsh	MFGe	8,565	21,165	5.28%	34,260
Spoil	OAS	62	153	0.04%	247
Tall Sawgrass Marsh-Dense	MFGcTD	8,390	20,733	5.17%	33,561
Tall Sawgrass Marsh-Sparse	MFGcTS	43	107	0.03%	173

<b>Thematic Class</b>	<b>Thematic Class Code</b>	<b>Area (ha)</b>	<b>Area (Ac)</b>	<b>Percent Area</b>	<b>Number of Mapped Cells</b>
Transitional Bayhead Forest	FSBT	175	433	0.11%	701
Transitional Bayhead Shrubland	SSBT	138	342	0.09%	553
Transitional Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense	CSBTGcSD	15	37	0.01%	60
Transitional Bayhead Swamp Scrub-Spikerush Marsh	CSBTGe	1	1	<0.01%	2
Transitional Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense	CSBTGcTD	55	135	0.03%	219
Tropical Hardwood Hammock	FHS	1,394	3,443	0.86%	5,574
Tropical Hardwood Shrubland	SUH	496	1,224	0.31%	1,982
Tropical Hardwood Woodland	WUHS	29	72	0.02%	116
Upland Hardwood Scrub-Graminoid Prairie	CUWGP	2,911	7,193	1.79%	11,643
Water	ONW	36	88	0.02%	142
Waterlily Marsh	MFFy	167	413	0.10%	668
Wax Myrtle Scrub-Graminoid Prairie	CSmGP	3	8	<0.01%	13
Wax Myrtle Scrub-Herbaceous Marsh	CSmH	0	1	<0.01%	1
Wax Myrtle Shrubland	SSm	1	2	<0.01%	3
West Indian Mahogany Hammock	FHCg	11	26	0.01%	42
Willow Scrub-Cattail Marsh	CSsGt	131	323	0.08%	523
Willow Scrub-Common Reed Marsh	CSsGg	1	2	<0.01%	4
Willow Scrub-Emergent Marsh	CSsE	1	3	<0.01%	5
Willow Scrub-Herbaceous Marsh	CSsH	3	7	<0.01%	12
Willow Scrub-Mixed Graminoid Marsh	CSsGX	56	139	0.03%	225
Willow Scrub-Short Sawgrass Marsh-Dense	CSsGcSD	223	550	0.14%	891
Willow Scrub-Short Sawgrass Marsh-Sparse	CSsGcSS	3	7	<0.01%	11
Willow Scrub-Spikerush Marsh	CSsGe	0	1	<0.01%	1

<b>Thematic Class</b>	<b>Thematic Class Code</b>	<b>Area (ha)</b>	<b>Area (Ac)</b>	<b>Percent Area</b>	<b>Number of Mapped Cells</b>
Willow Scrub-Tall Sawgrass Marsh-Dense	CSsGcTD	800	1,976	0.49%	3,198
Willow Scrub-Tall Sawgrass Marsh-Sparse	CSsGcTS	1	1	<0.01%	2
Willow Shrubland	SSs	1,092	2,698	0.67%	4,367

## Appendix D. Accuracy Assessment Table for the Shark River Slough/Long Pine Key, Region 1, Vegetation Map of Everglades National Park.

Table C-1. Accuracy assessment table for the Shark River Slough/Long Pine Key, Region 1, vegetation map. Superscripts identify the acceptance criteria as outlined in the methods section of the report and are as followed: (1) vegetation map class correct at level mapped; (2) vegetation map class more detailed than assessment points; (3) assessment point at boundary between two similar classes, height or cover, difference; (4) sawgrass class modifier.

Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
Red Mangrove Scrub-Dominant (CMrD)	Red Mangrove Scrub–Open water <sup>3</sup>	0	1	1	-	-
	<b>Red Mangrove Scrub-Dominant Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>100</b>
Red Mangrove Scrub-Spikerush Marsh (CMrGe)	Red Mangrove Scrub-Sawgrass Marsh	0	0	1	-	-
	Red Mangrove Scrub-Graminoid Marsh <sup>2</sup>	0	1	1	-	-
	<b>Red Mangrove Scrub-Spikerush Marsh Total</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>50</b>
Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense (CSBGcSD)	Pond Apple Scrub-Graminoid Marsh <sup>3</sup>	0	1	1	-	-
	Buttonbush Scrub-Sawgrass Marsh <sup>3</sup>	0	1	1	-	-
	<b>Bayhead Swamp Scrub-Short Sawgrass Marsh-Dense Total</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>100</b>
Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense (CSBGcTD)	Buttonbush Scrub-Sawgrass Marsh	0	0	1	-	-
	Wax Myrtle Scrub-Graminoid Marsh	0	1	1	-	-
	Short Sawgrass Marsh-Dense <sup>3</sup>	0	0	1	-	-
	<b>Bayhead Swamp Scrub-Tall Sawgrass Marsh-Dense Total</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>33</b>

Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
Willow Scrub-Short Sawgrass Marsh-Dense (CSsGcSD)	Willow Scrub-Sawgrass Marsh <sup>4</sup>	0	1	1	-	-
	<b>Willow Scrub-Short Sawgrass Marsh-Dense Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>100</b>
Cypress Scrub-Short Sawgrass Marsh-Dense (CStGcSD)	Cypress Scrub-Graminoid Prairie	0	0	1	-	-
	Cypress Scrub-Short Sawgrass Marsh <sup>4</sup>	0	1	1	-	-
	<b>Cypress Scrub-Short Sawgrass Marsh-Dense Total</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>50</b>
Cypress Scrub-Graminoid Prairie (CStGP)	Cypress Scrub-Short Sawgrass Marsh	0	0	1	-	-
	Cypress Scrub-Sawgrass Prairie <sup>1</sup>	0	1	1	-	-
	Cypress Scrub-Muhly Grass Prairie <sup>1</sup>	0	2	2	-	-
	<b>Cypress Scrub-Graminoid Prairie Total</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>75</b>
Cypress Scrub-Mixed Graminoid Marsh (CStGX)	Cypress Scrub-Sawgrass Prairie <sup>3</sup>	0	1	1	-	-
	<b>Cypress Scrub-Mixed Graminoid Marsh Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>100</b>
Upland Hardwood Scrub-Graminoid Prairie (CUWGP)	Wax Myrtle Scrub-Graminoid Prairie	0	0	1	-	-
	Upland Hardwood Scrub-Sawgrass <sup>1</sup> Prairie	0	2	2	-	-
	Upland Hardwood Scrub-Mixed Graminoid Prairie <sup>1</sup>	0	2	2	-	-
	Beakrush Marsh	0	0	1	-	-
	<b>Upland Hardwood Scrub-Graminoid Prairie Total</b>	<b>0</b>	<b>4</b>	<b>6</b>	<b>0</b>	<b>67</b>
Brazilian Pepper (Es)	Brazilian Pepper	1	0	1	-	-

Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
	<b>Brazilian Pepper Total</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>100</b>	<b>100</b>
Tropical Hardwood Hammock (FHS)	Tropical Hardwood Hammock	12	12	12	-	-
	Bayhead Shrubland	0	0	1	-	-
	Tropical Hardwood Shrubland <sup>3</sup>	0	2	2	-	-
	<b>Tropical Hardwood Hammock Total</b>	<b>12</b>	<b>14</b>	<b>15</b>	<b>80</b>	<b>93</b>
Bayhead Forest (FSB)	Bayhead Forest	4	4	4	-	-
	Tropical Hardwood Hammock	0	0	1	-	-
	Bayhead Shrubland <sup>3</sup>	0	3	3	-	-
	Cocoplum Shrubland <sup>3</sup>	0	1	1	-	-
	<b>Bayhead Forest Total</b>	<b>4</b>	<b>4</b>	<b>9</b>	<b>44</b>	<b>89</b>
Short Sawgrass Marsh-Dense (MFGcSD)	Short Sawgrass Marsh-Dense	22	22	22	-	-
	Short Sawgrass Marsh-Sparse <sup>4</sup>	0	24	24	-	-
	Tall Sawgrass Marsh-Dense <sup>4</sup>	0	27	27	-	-
	Tall Sawgrass Marsh-Sparse <sup>3</sup>	0	5	5	-	-
	Beakrush Marsh	0	0	1	-	-
	Mixed Graminoid Freshwater Marsh <sup>3</sup>	0	3	3	-	-
	Sawgrass-Rhynchospora Marsh <sup>3</sup>	0	1	1	-	-
	<b>Short Sawgrass Marsh-Dense Total</b>	<b>22</b>	<b>60</b>	<b>83</b>	<b>27</b>	<b>99</b>
Short Sawgrass Marsh-Sparse (MFGcSS)	Short Sawgrass Marsh-Sparse	1	1	1	-	-
	Graminoid Freshwater Prairie	0	0	1	-	-
	<b>Short Sawgrass Marsh-Sparse Total</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>50</b>	<b>50</b>
Tall Sawgrass Marsh-Dense (MFGcTD)	Tall Sawgrass Marsh-Dense	7	7	7	-	-
	Short Sawgrass Marsh-Dense <sup>4</sup>	0	2	2	-	-
	Tall Sawgrass Marsh-Sparse <sup>4</sup>	0	4	4	-	-
	Pond Apple Scrub-Sawgrass Marsh	0	0	1	-	-

Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
	Buttonbush Scrub-Sawgrass Marsh	0	0	1	-	-
	<b>Tall Sawgrass Marsh-Dense Total</b>	<b>7</b>	<b>13</b>	<b>15</b>	<b>47</b>	<b>87</b>
Spikerush Marsh (MFGe)	Spikerush Marsh	9	9	9	-	-
	Mixed Graminoid Freshwater Marsh <sup>3</sup>	0	4	4	-	-
	Short Sawgrass Marsh-Sparse	0	0	2	-	-
	Beakrush Marsh	0	0	1	-	-
	<b>Spikerush Marsh Total</b>	<b>9</b>	<b>13</b>	<b>16</b>	<b>56</b>	<b>81</b>
Graminoid Freshwater Prairie (MFGP)	Graminoid Freshwater Prairie	1	1	1	-	-
	Cypress Scrub-Short Sawgrass Marsh	0	0	1	-	-
	Cypress Scrub-Sawgrass Prairie	0	0	1	-	-
	Cypress Pine Scrub- Mixed Graminoid Prairie	0	0	1	-	-
	Upland Hardwood Scrub-Sawgrass Prairie	0	0	2	-	-
	Upland Hardwood Scrub-Mixed Graminoid Prairie <sup>3</sup>	0	1	2	-	-
	Short Sawgrass Marsh-Sparse	0	0	3	-	-
	Sawgrass Prairie <sup>1</sup>	0	14	14	-	-
	Muhly Grass Prairie <sup>1</sup>	0	6	6	-	-
	Mixed Graminoid Freshwater Prairie <sup>1</sup>	0	35	35	-	-
	Mixed Graminoid Freshwater Marsh <sup>3</sup>	0	1	2	-	-
	<b>Graminoid Freshwater Prairie Total</b>	<b>1</b>	<b>58</b>	<b>68</b>	<b>1</b>	<b>85</b>
Beakrush Marsh (MFGr)	Beakrush Marsh	1	1	1	-	-
	Mixed Graminoid Freshwater Marsh <sup>3</sup>	0	1	1	-	-
	<b>Beakrush Marsh Total</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>50</b>	<b>100</b>
Mixed Graminoid Freshwater Marsh (MFGX)	Mixed Graminoid Freshwater Marsh	8	8	8	-	-



Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
	Willow Scrub-Graminoid Marsh	0	0	1	-	-
	Short Sawgrass Marsh-Sparse <sup>3</sup>	0	15	15	-	-
	Tall Sawgrass Marsh-Sparse <sup>3</sup>	0	1	1	-	-
	Spikerush Marsh <sup>3</sup>	0	2	2	-	-
	Graminoid Freshwater Prairie	0	0	1	-	-
	Beakrush Marsh <sup>3</sup>	0	1	1	-	-
	Sawgrass-Rhynchospora Marsh <sup>3</sup>	0	1	1	-	-
	<b>Mixed Graminoid Freshwater Marsh Total</b>	<b>8</b>	<b>28</b>	<b>30</b>	<b>27</b>	<b>93</b>
Sawgrass-Rhynchospora Marsh (MFGXcr)	Sawgrass-Rhynchospora Marsh	1	1	1	-	-
	Short Sawgrass Marsh-Sparse <sup>3</sup>	0	3	3	-	-
	Beakrush Marsh <sup>3</sup>	0	1	1	-	-
	<b>Sawgrass-Rhynchospora Marsh Total</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>20</b>	<b>100</b>
Bayhead Shrubland (SSB)	Bayhead Shrubland	1	1	1	-	-
	Bayhead Forest <sup>3</sup>	0	1	1	-	-
	<b>Bayhead Shrubland Total</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>50</b>	<b>100</b>
Willow Shrubland (SSs)	Willow Shrubland	2	2	2	-	-
	<b>Willow Shrubland Total</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>100</b>	<b>100</b>
Tropical Hardwood Shrubland (SUH)	Saw Palmetto Shrubland <sup>3</sup>	0	1	1	-	-
	<b>Tropical Hardwood Shrubland Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>100</b>
Cypress Woodland-Graminoid Prairie (WStGP)	Cypress Woodland-Mixed Graminoid Prairie <sup>1</sup>	0	1	1	-	-
	<b>Cypress Woodland-Graminoid Prairie Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>100</b>
Pine Rockland-Graminoid (WUpRG)	Pine Rockland-Graminoid	2	2	2	-	-

Map Annotation	Accuracy Assessment Annotation	One-to-One Match	Number of Accepted Points	Number of Accuracy Assessment Points	One-to-One Match Correct (%)	Final Map Annotation Assessment (%)
	<b>Pine Rockland-Graminoid Total</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>100</b>	<b>100</b>
Pine Rockland-Shrubs (WUpRS)	Pine Rockland-Shrubs	1	1	1	-	-
	Tropical Hardwood Hammock	0	0	1	-	-
	Pine Rockland-Graminoid <sup>3</sup>	0	2	2	-	-
	Pine Rockland-Saw Palmetto <sup>3</sup>	0	2	2	-	-
	Pine Rockland-Mixed	0	5	5	-	-
	<b>Pine Rockland-Shrubs Total</b>	<b>1</b>	<b>10</b>	<b>11</b>	<b>9</b>	<b>91</b>
Pine Rockland-Mixed (WUpRX)	Pine Rockland-Mixed	1	2	1	-	-
	Pine Rockland-Graminoid <sup>3</sup>	0	1	1	-	-
	Upland Hardwood Scrub-Sawgrass Prairie	0	0	1	-	-
	<b>Pine Rockland-Mixed Total</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>33</b>	<b>66</b>
<b>Totals</b>	<b>-</b>	<b>71</b>	<b>260</b>	<b>290</b>	<b>24.5</b>	<b>89.7</b>